

Bristol Bay Red King Crab Information

Appendix 2¹

The information in this appendix is a supplement to Section 4 of the Bristol Bay Red King Crab (BBRKC) Information discussion paper (Agenda Item D1). That section – *Item 3: Bottom Contact by Pelagic Trawl Gear* – includes maps and a time series line graph that show estimated bottom contact by pelagic trawl gear in the eastern Bering Sea from 2003 through 2021 (Figures 4-1 through 4-4). The map figures in the discussion paper compress estimations across periods of time (months or seasons, over the 2003-2021 period) for the purpose of concise presentation. The analysts realize, however, that readers might want a more granular look at how estimated bottom contact may differ in total amount and spatial distribution between years and within seasons (i.e., monthly). This appendix provides the full set of monthly bottom contact estimates for the entire study period.

The following materials² include:

- A continuous timeline plot with a monthly time-step (each month marked by a point) showing total estimated “Swept Area” within the studied area. This is directly analogous to Figure 4-4 in the discussion paper but sums monthly estimates across the areas that were broken out individually in Figure 4-4. This plot is a useful reference to put into context the estimated swept area (km²) that is shown in parentheses in the title of each monthly map (see next bullet).
- The bulk of this appendix is a catalogue of month-by-month maps that illustrate the estimated swept area in the region of interest. The analyzed period runs from 2003 through 2021. The start date is a function of the fact that the Fishing Effects model – upon which the bottom contact adjustments used in the estimates are based – begins in 2003. The 2003 start date does not hold any particular significance in terms of how the Bering Sea pelagic trawl (pollock) fishery operates or is managed, though management changes relating to salmon bycatch minimization are noted in Section 5 of the discussion paper. Each map identifies the month, year, and total estimated swept area in the title. The total swept area per month (km²) in each 5-kilometer grid cell is plotted in nominal terms but the colors are adjusted to a logarithmic scale to better illustrate contrast. This means that each major step on the color-scale bar includes ten units; e.g., ten steps between 0.1 and 1; ten steps between 10 and 100. The color scale runs from yellow (very low) to purple (very high). Without the scale adjustment, many grid cells would appear similar. The relative “weight” of dark/purple cells in these monthly maps is greater than those shown in the discussion paper where any cell with a swept area estimate greater than 5 km² has the same shading and cell estimates are somewhat muted by averaging across time periods (as in Figures 4-1 through 4-3).
- To better illustrate the generally consistent annual spatial cycle of bottom contact, the maps covering 2016 through 2021 are combined into an animation (GIF file) that is attached separately to the Council’s April 2022 eAgenda. Watching this animated loop should familiarize the reader with intra-annual patterns. If the reader wishes to explore a particular year or a month more closely then he or she may look at the static maps provided here for each month of the 2003-2021 period.

The reader of this appendix should refer to the description of how bottom contact estimates (swept area; km²) are derived on pages 25-26 of the discussion paper. The maps display a new way to show the best available estimates of bottom contact by pelagic trawl gear that are built on the parameters used in the

¹ Prepared by Sam Cunningham (NPFMC)

² Maps produced by Fisheries, Aquatic Sciences & Technology (FAST) Lab at Alaska Pacific University (F. Restrepo) in coordination with NPFMC staff, 2022.

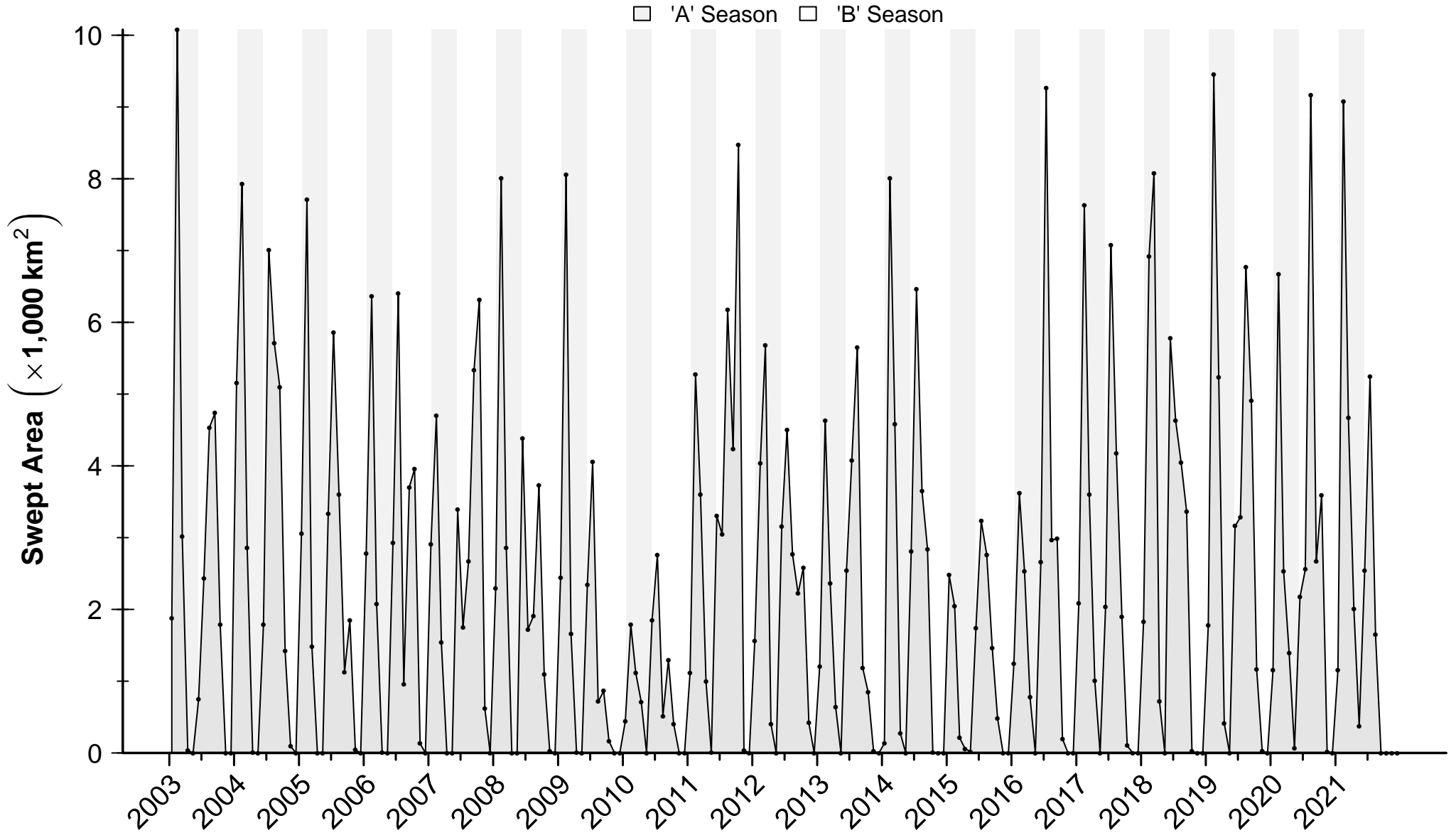
Fishing Effects (FE) model but are fundamentally different from that model and how its outputs are meant to be interpreted. The swept area calculations in this appendix, and in the discussion paper, are a straightforward estimate of when, where, and how much pelagic trawl gear may be contacting the seafloor. By contrast, the FE model is a cumulative representation of the impact of *all gears* on benthic habitat, accounting for not only bottom contact but also the susceptibility of biological and geological habitats and recovery from fishery disturbance.

The swept area estimates in this analysis take Vessel Monitoring System (VMS) tracks – which are comprehensive given this fleet’s level of monitoring – and puts them through the “FE model” adjustment parameters that translate ‘tow length’ and ‘maximum trawl width’ to bottom contact. Those parameters have been reviewed by the SSC as part of the Essential Fish Habitat process. The calculation of bottom contact, or “swept area”, is the result of a two-step process: (1) assigning pelagic trawl tow tracks a ‘nominal width’, and (2) estimating the proportion of the nominally swept area that was subject to bottom contact. The first step uses FE parameters to estimate how wide a trawl net is likely to be spread based on a variety of factors (e.g., vessel size/type, area, season, target, fishing depth); this is the nominal width. The second step interacts ‘nominal width * tow length’ with an adjustment for how often gear is estimated to be contacting the seafloor on a given tow using the information listed previously as well as empirical studies that link event-level characteristics to the probability of a trawl contacting the seafloor. This process is performed for every pelagic trawl tow in the studied area/period and estimates are projected at the 5 km grid level.

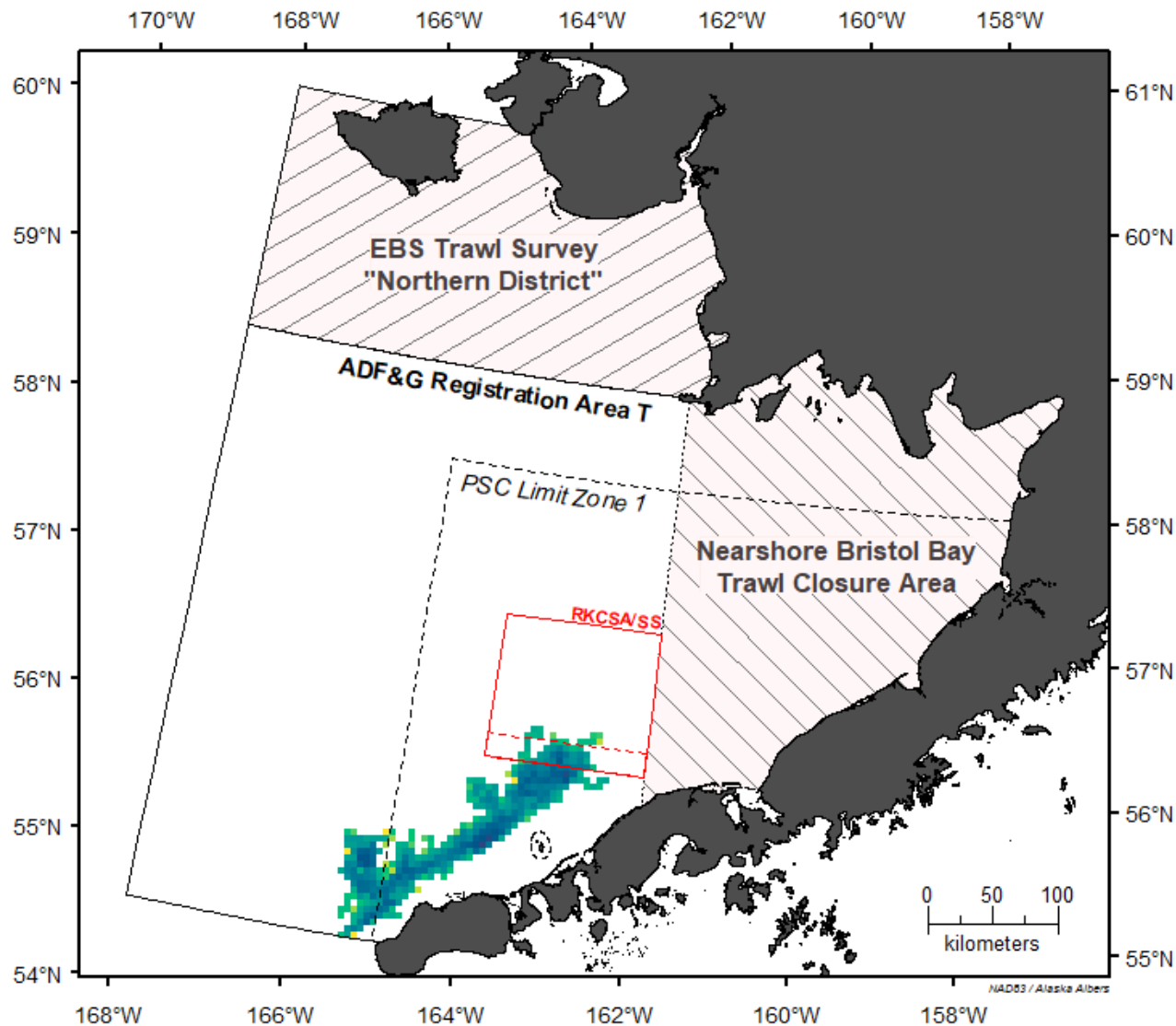
As noted throughout the discussion paper, this version of bottom contact estimates may be an essential tool for considering the impact of fishing gear on bycatch species and the benthic environment but these estimates are not analogues for direct impacts since they do not incorporate data on the time-specific location of bycatch species, the shell condition of crustaceans, or the nature of the substrate that is being contacted.

Total Monthly Swept Area by PTR

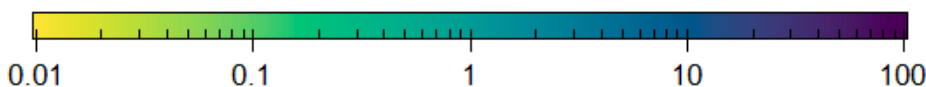
(RKCSA/SS, ADFG Registration Area T, & PSC Limit Zone 1)



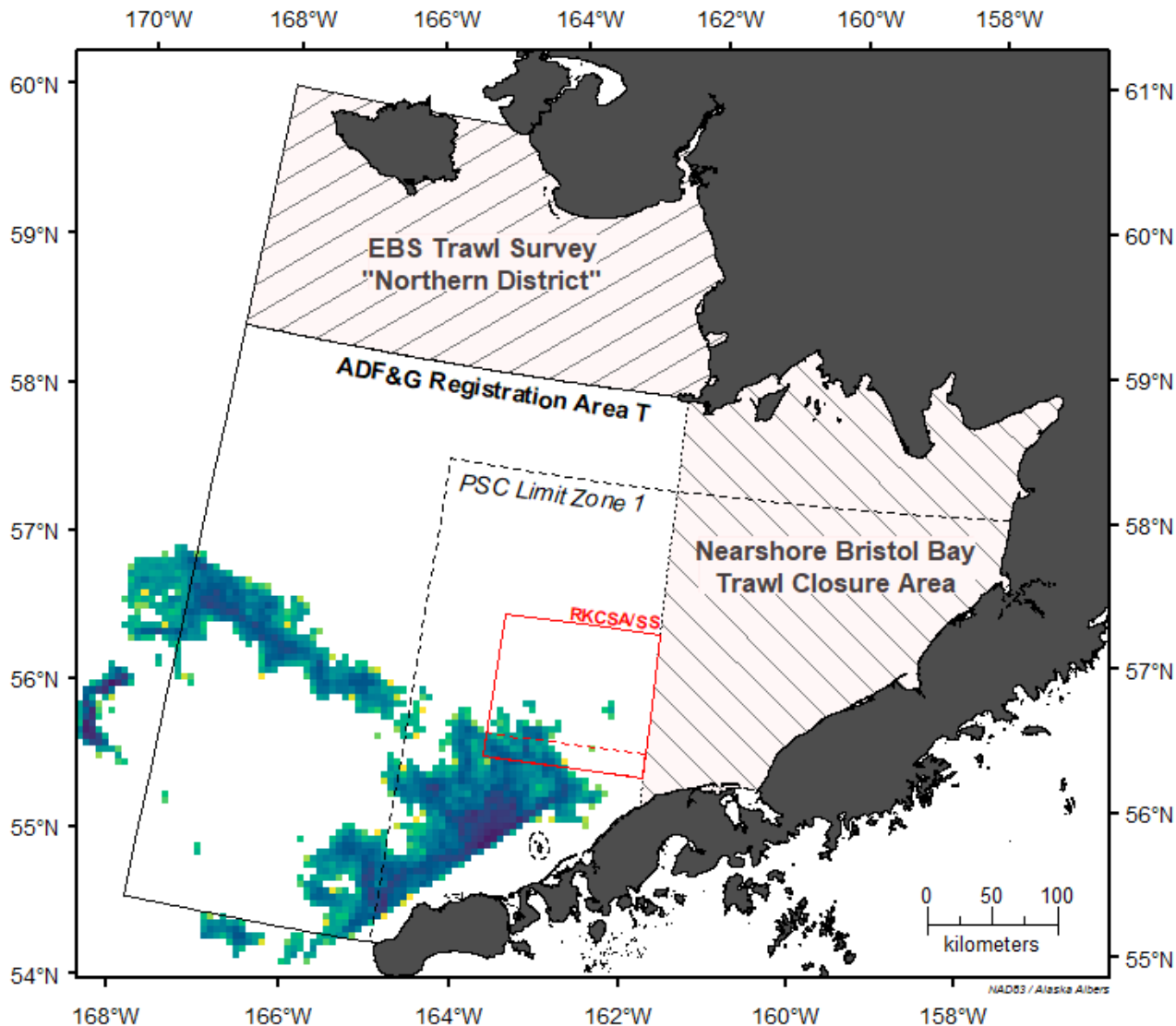
January 2003: Total Swept Area (SA), by PTR (1,879.4 km²)



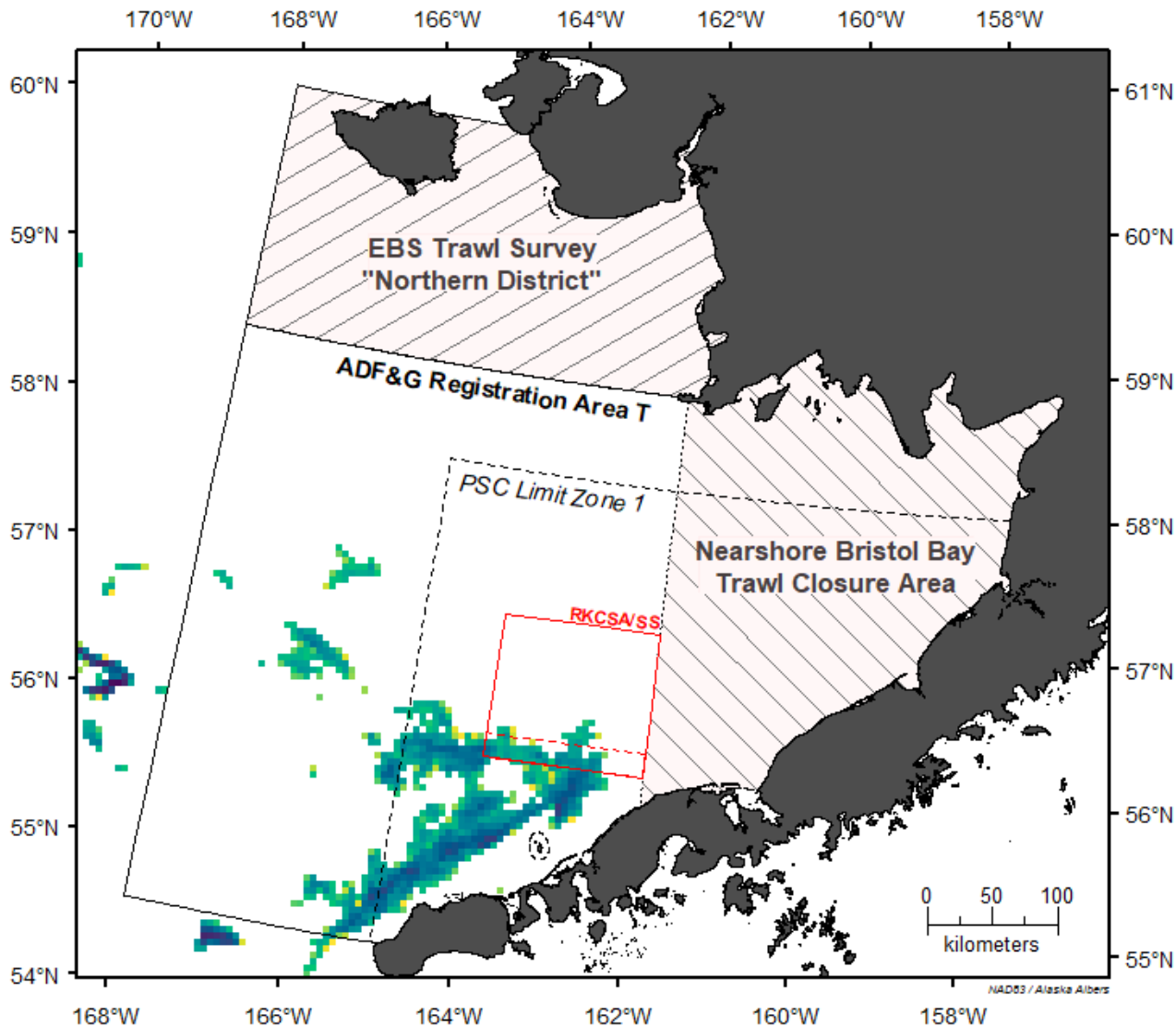
SA, km²



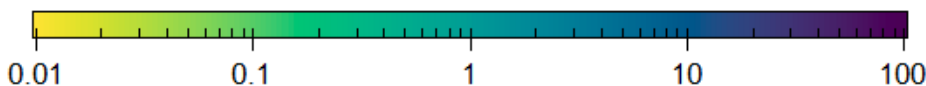
February 2003: Total Swept Area (SA), by PTR (10,076.8 km²)



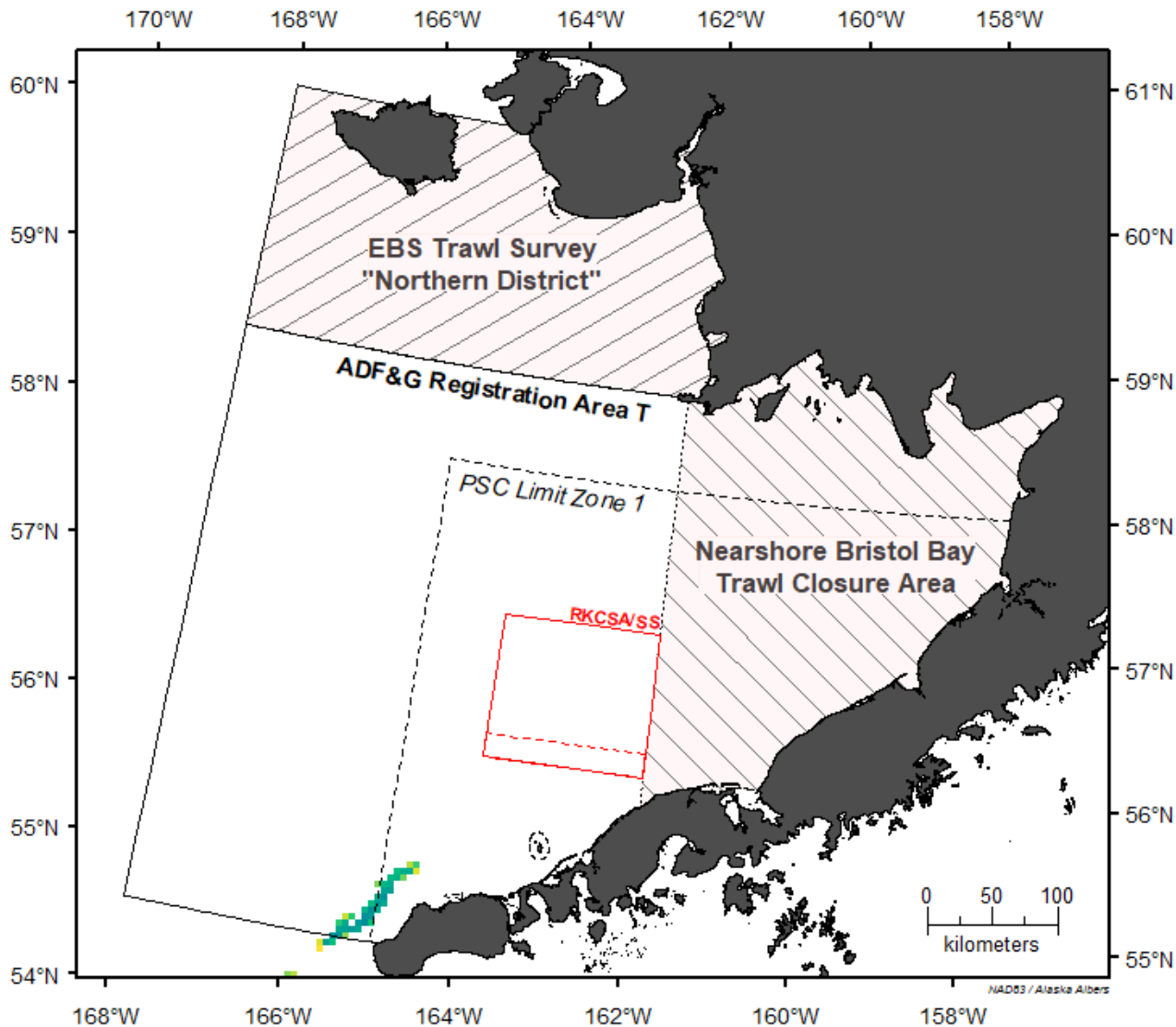
March 2003: Total Swept Area (SA), by PTR (3,010.8 km²)



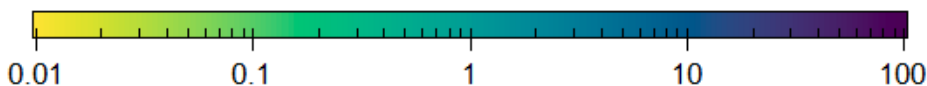
SA, km²



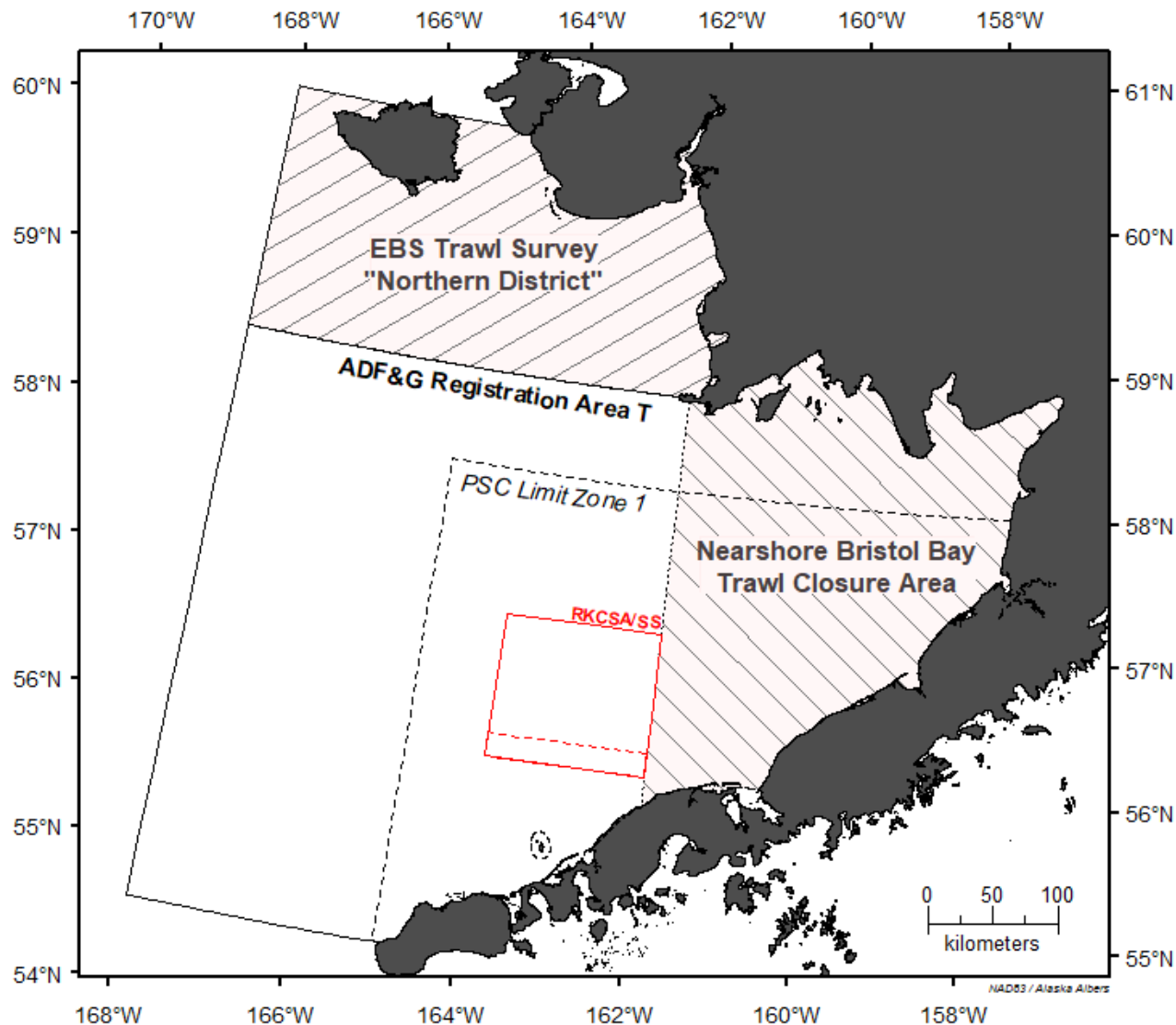
April 2003: Total Swept Area (SA), by PTR (35.6 km²)



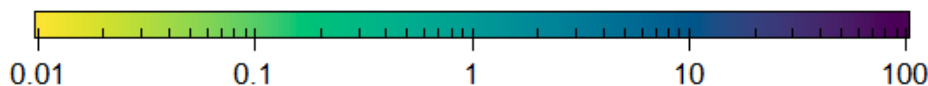
SA, km²



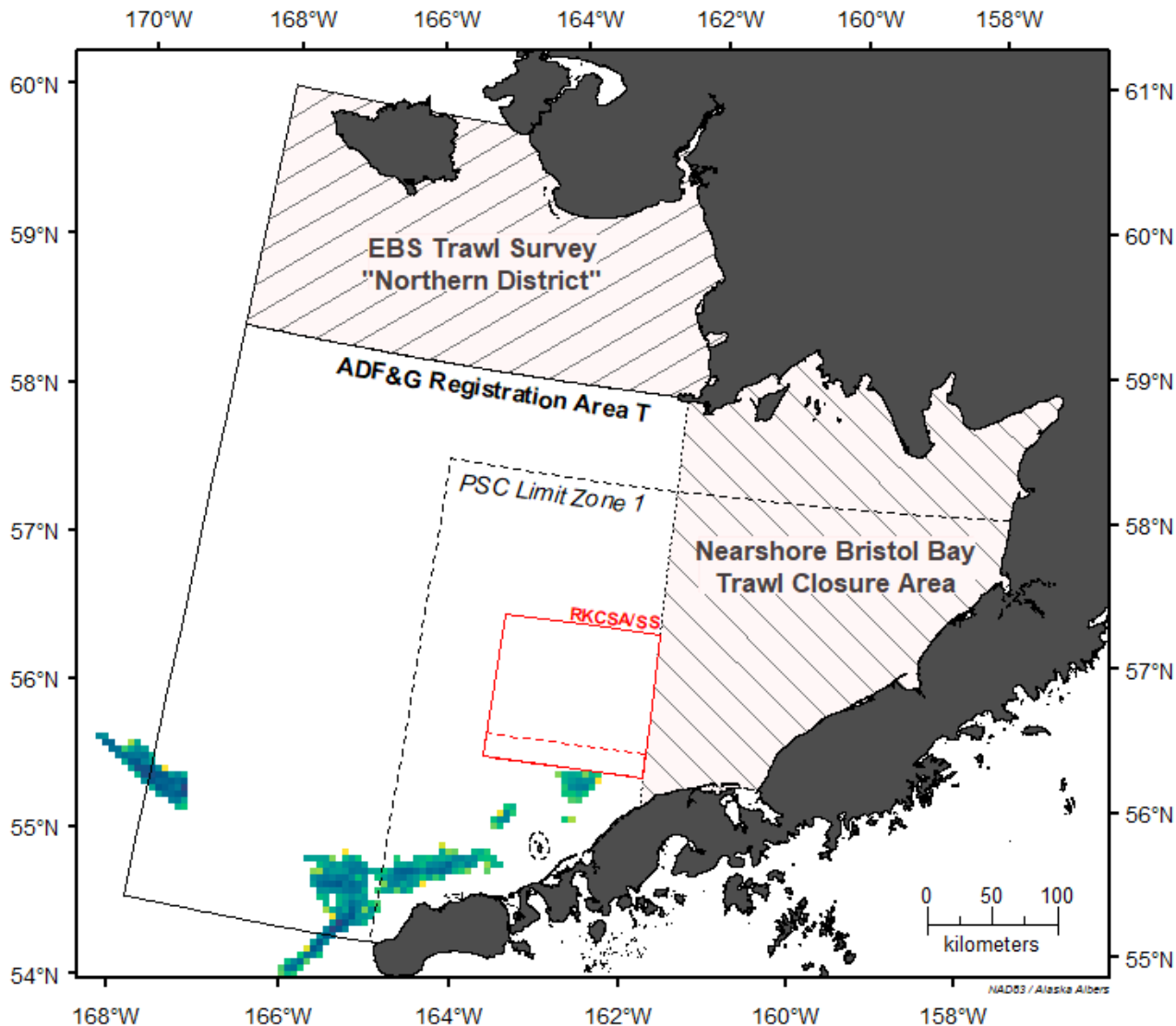
May 2003: Total Swept Area (SA), by PTR (0 km²)



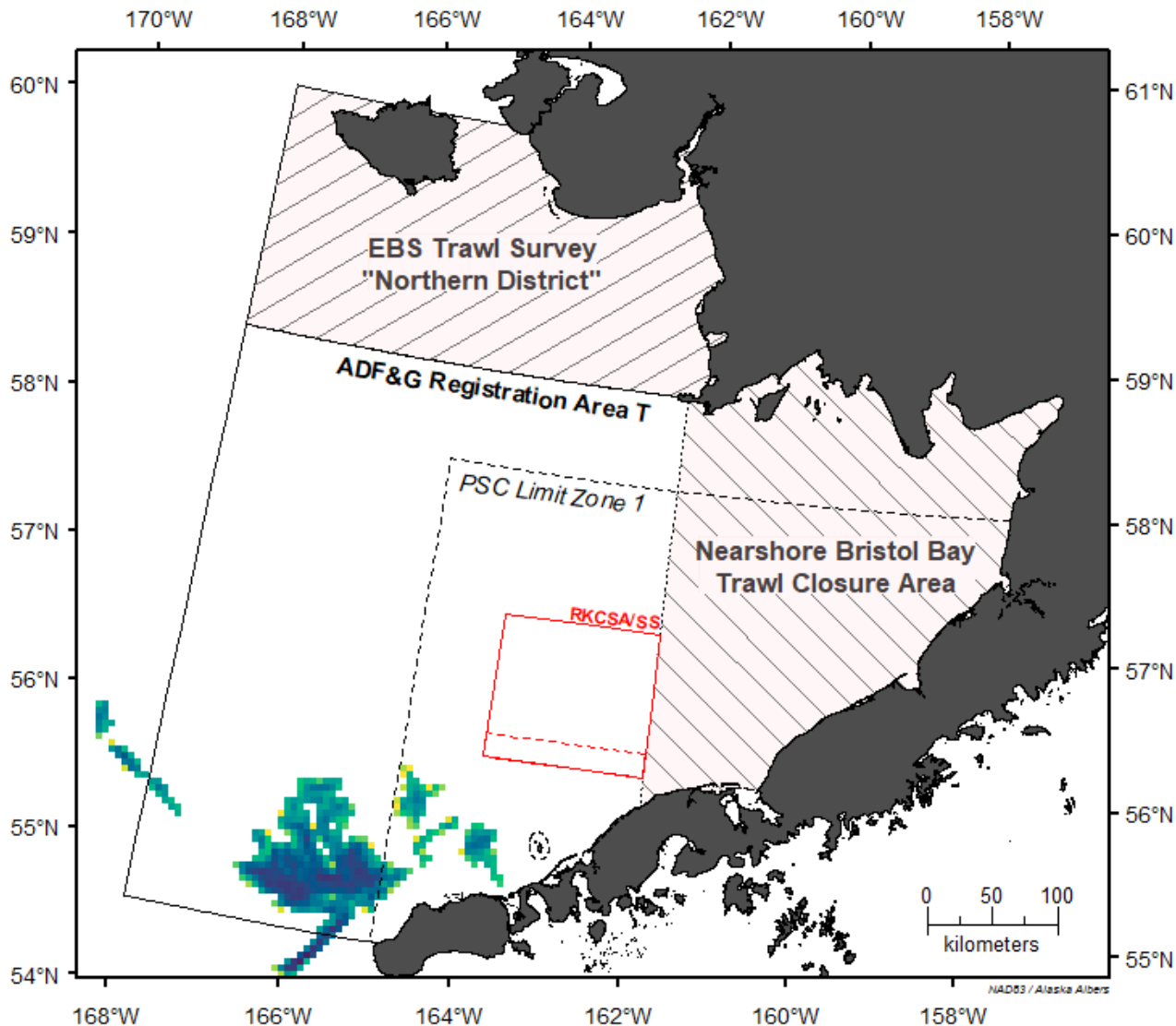
SA, km²



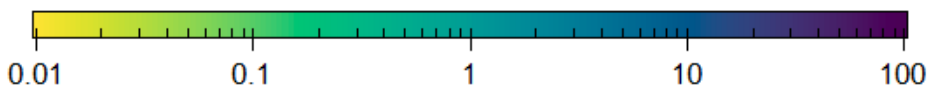
June 2003: Total Swept Area (SA), by PTR (745.9 km²)



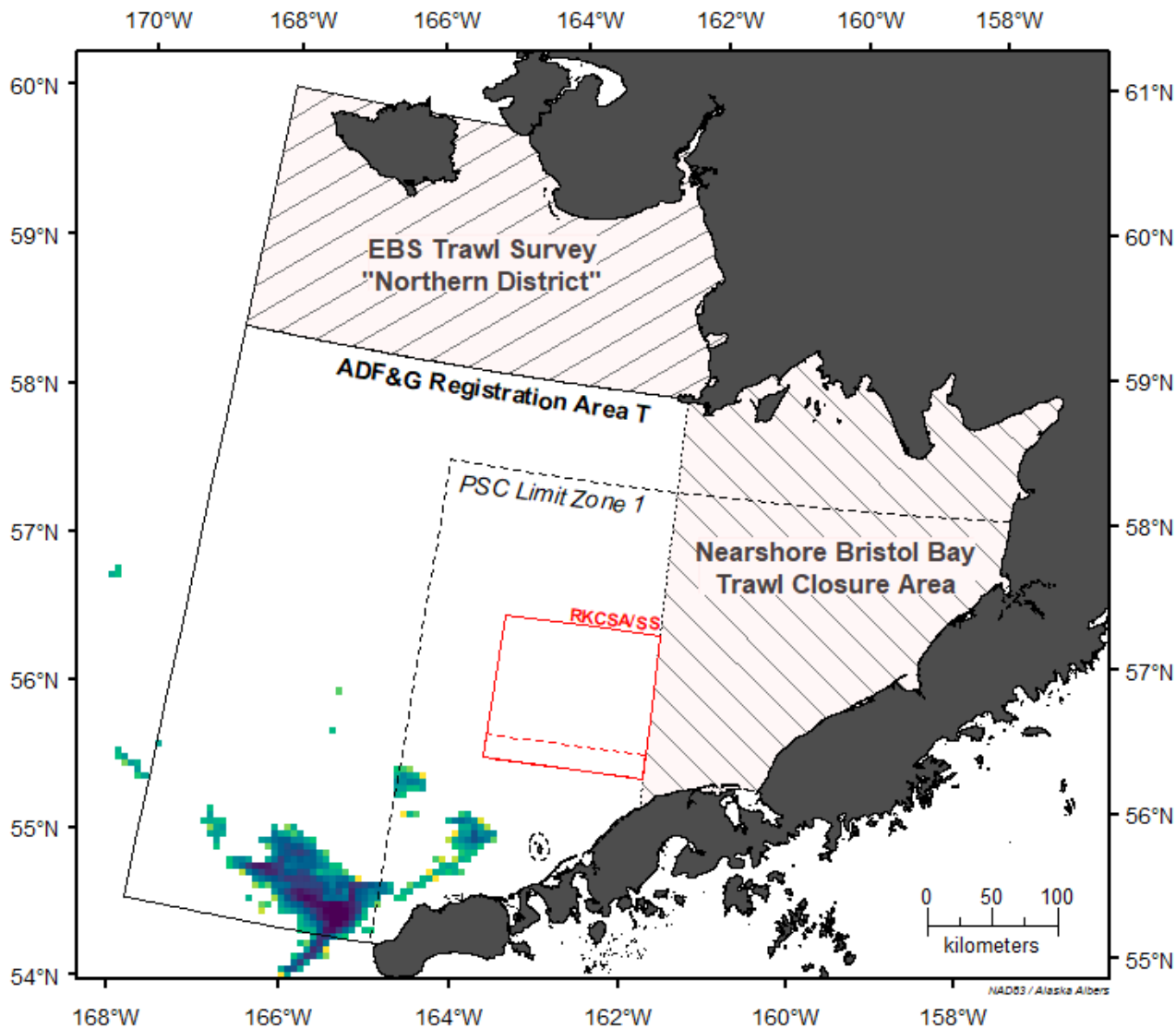
July 2003: Total Swept Area (SA), by PTR (2,431.7 km²)



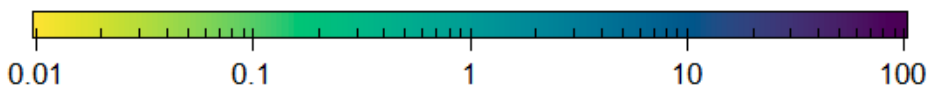
SA, km²



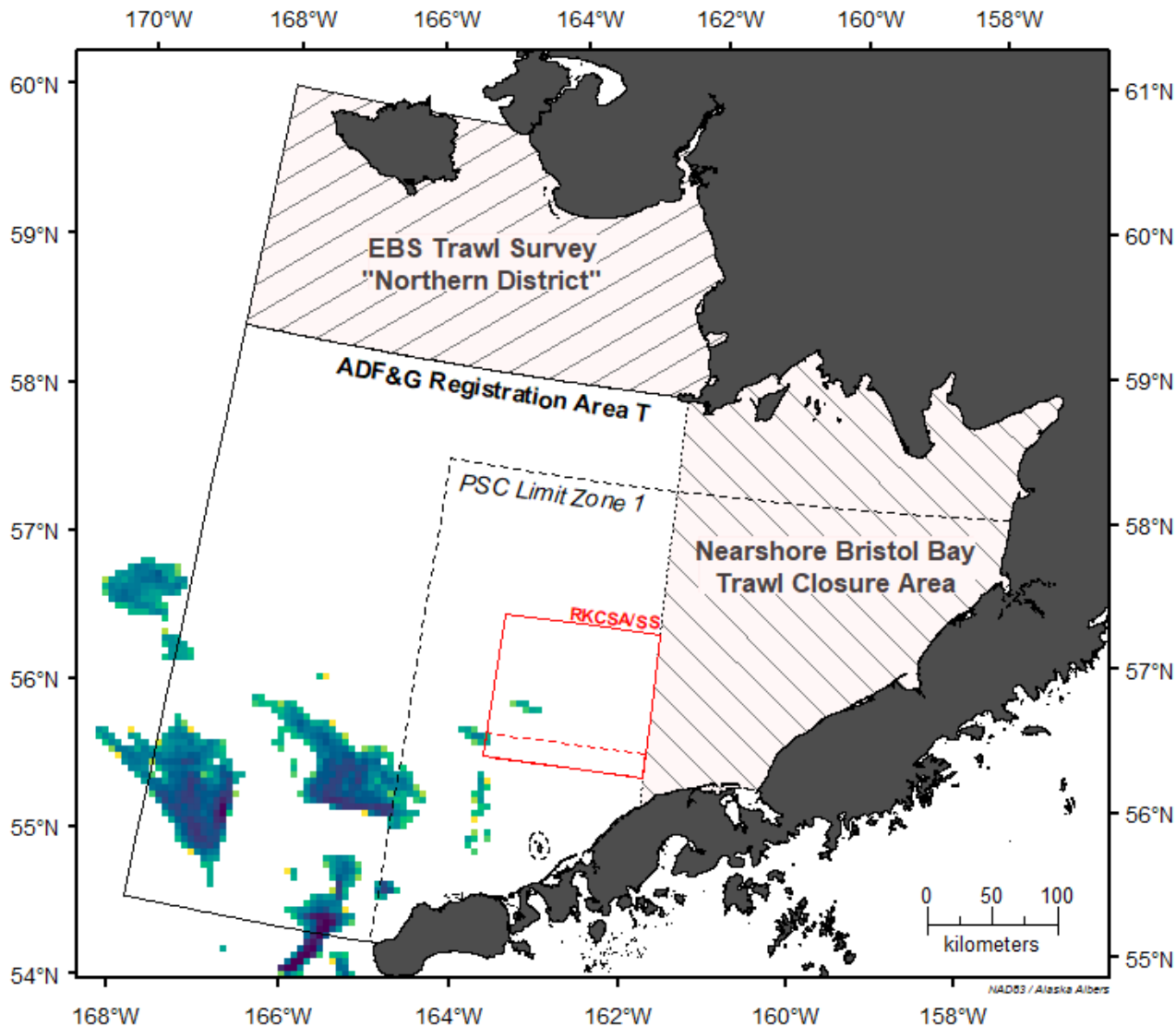
August 2003: Total Swept Area (SA), by PTR (4,533 km²)



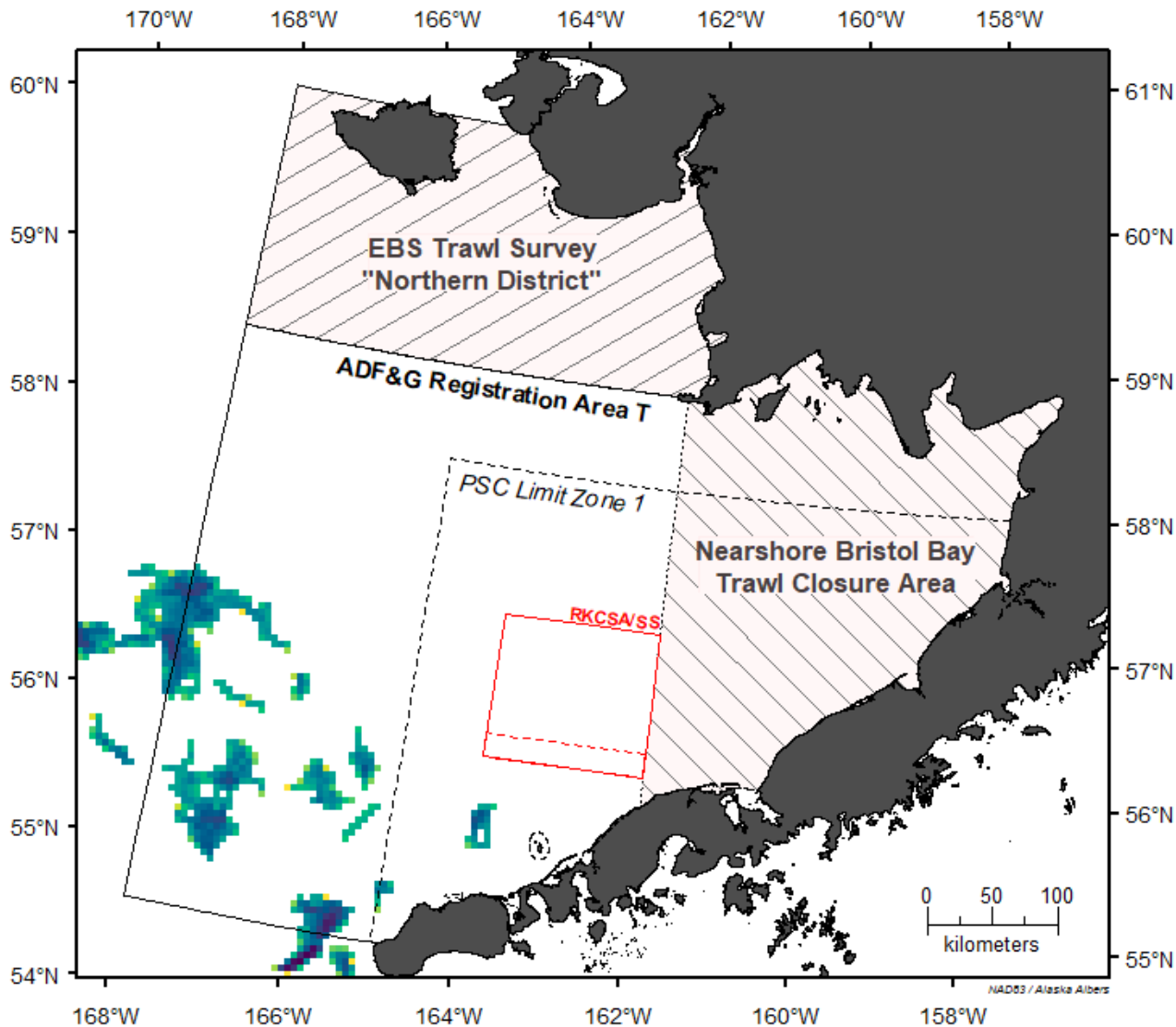
SA, km²



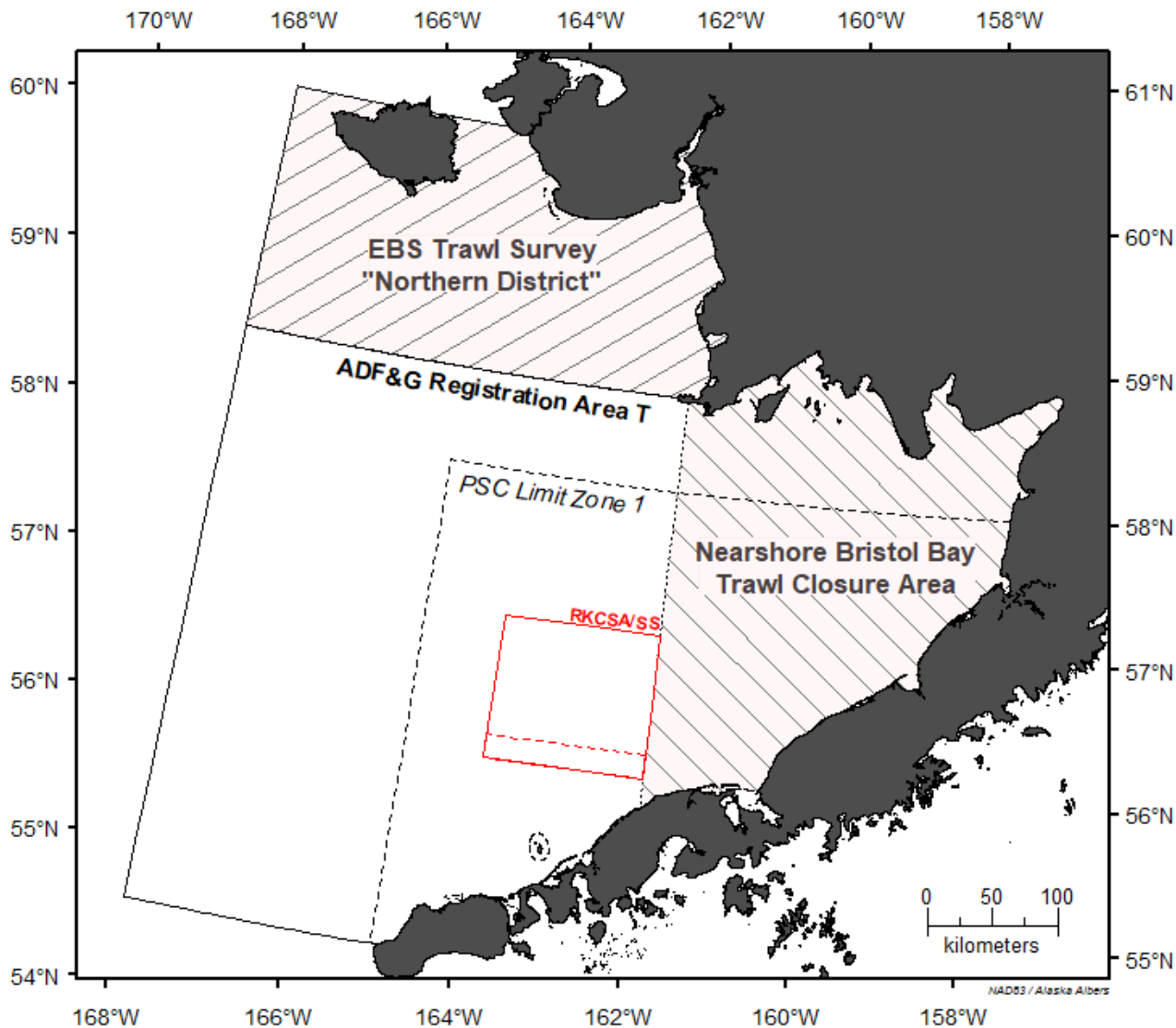
September 2003: Total Swept Area (SA), by PTR (4,733.5 km²)



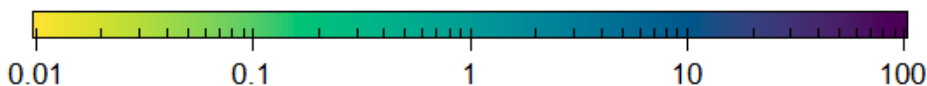
October 2003: Total Swept Area (SA), by PTR (1,789.2 km²)



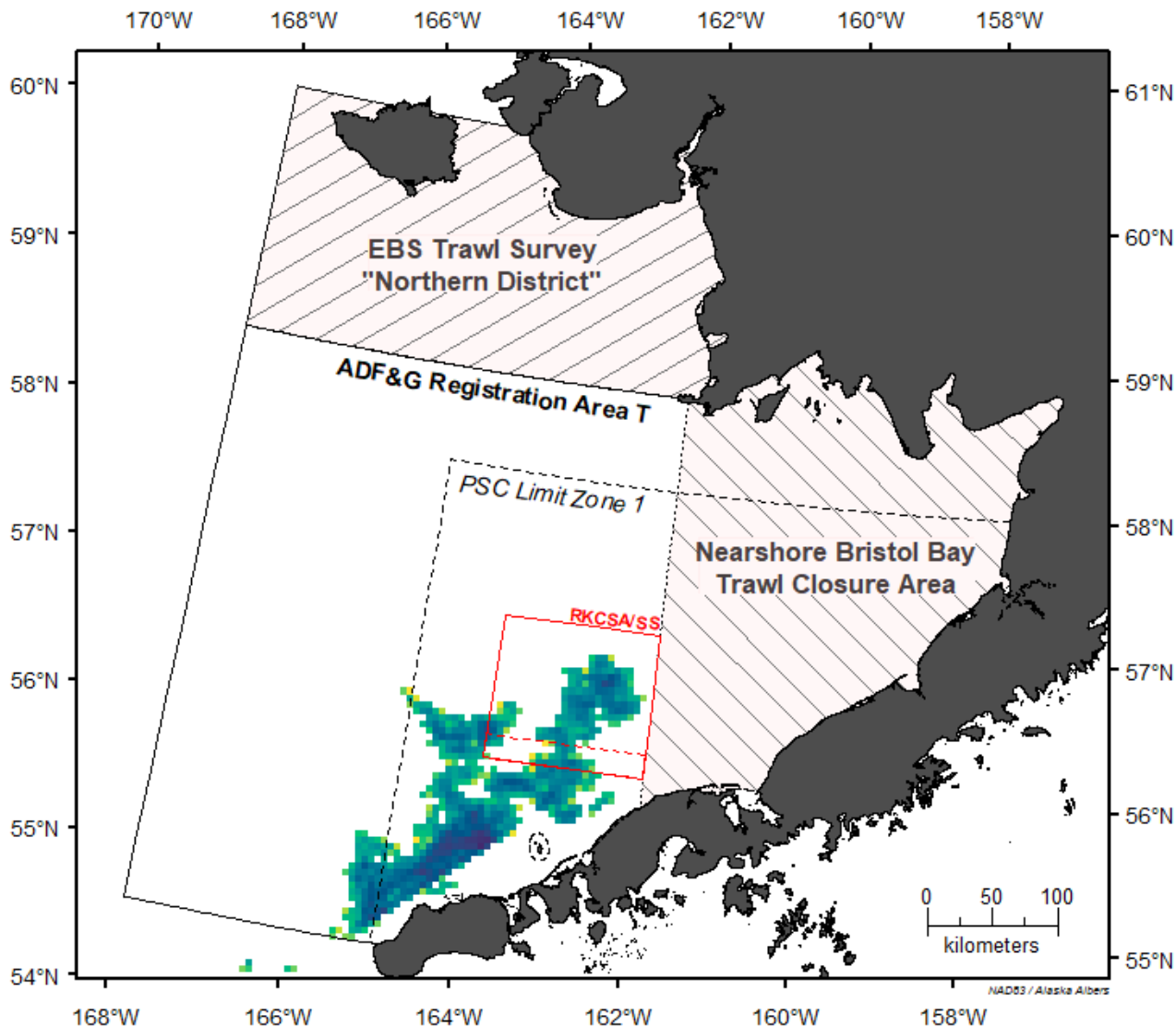
November 2003: Total Swept Area (SA), by PTR (0 km²)



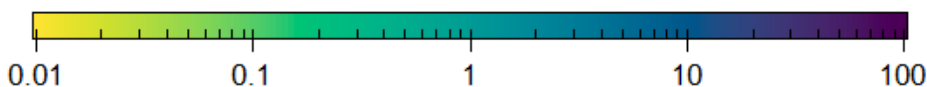
SA, km²



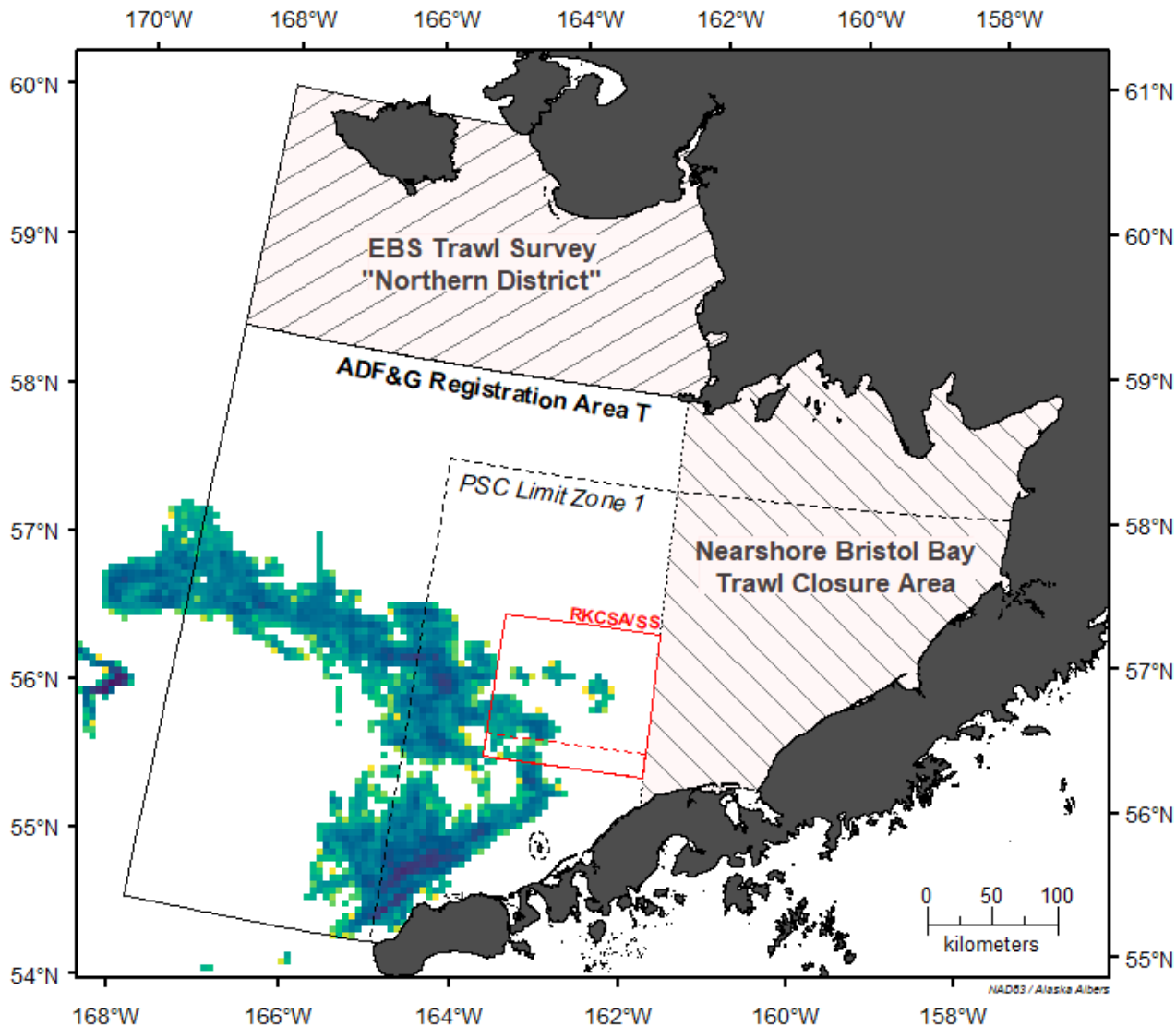
January 2004: Total Swept Area (SA), by PTR (5,154.3 km²)



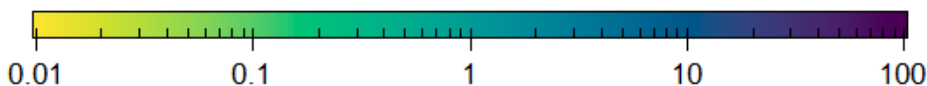
SA, km²



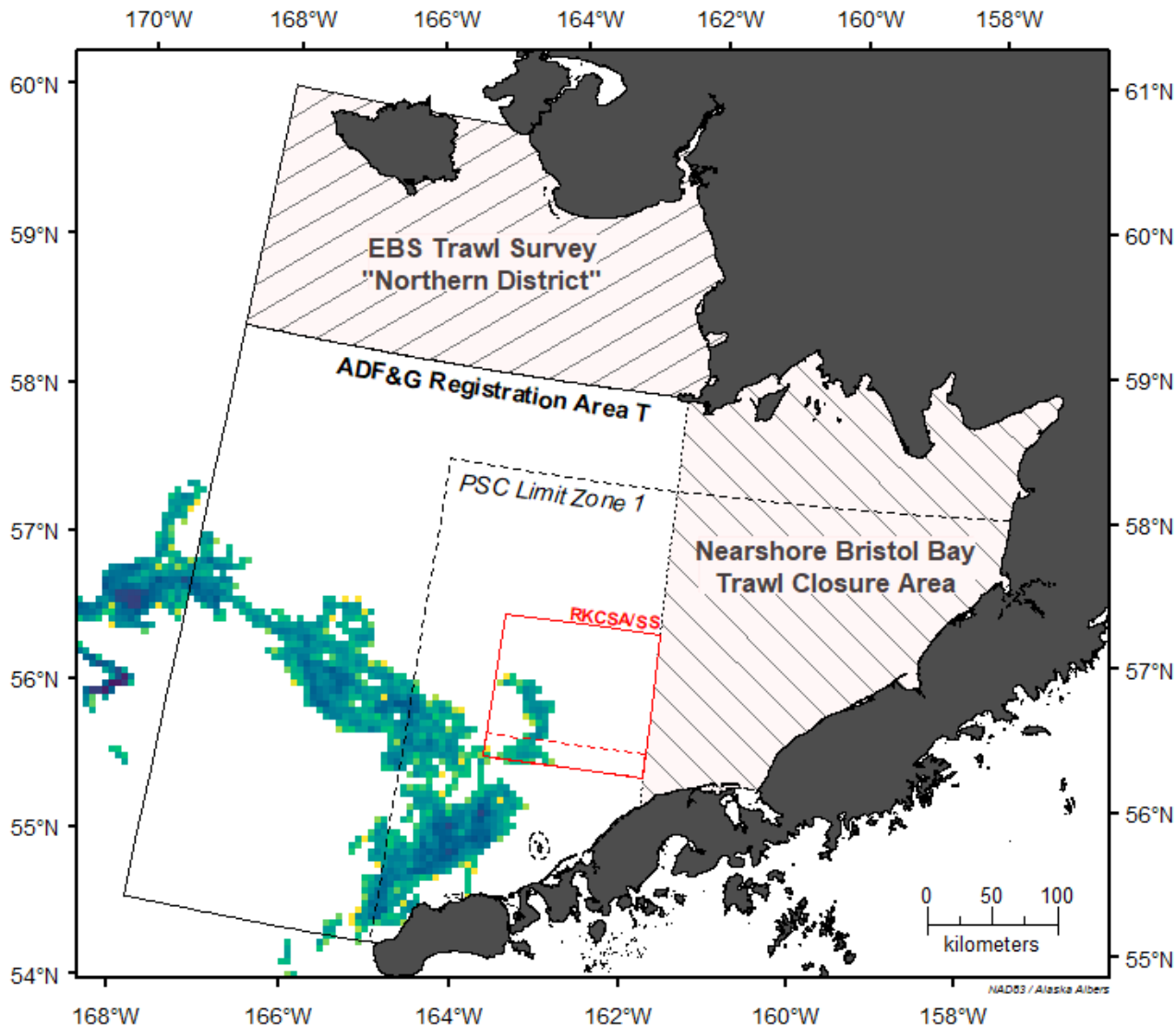
February 2004: Total Swept Area (SA), by PTR (7,926.4 km²)



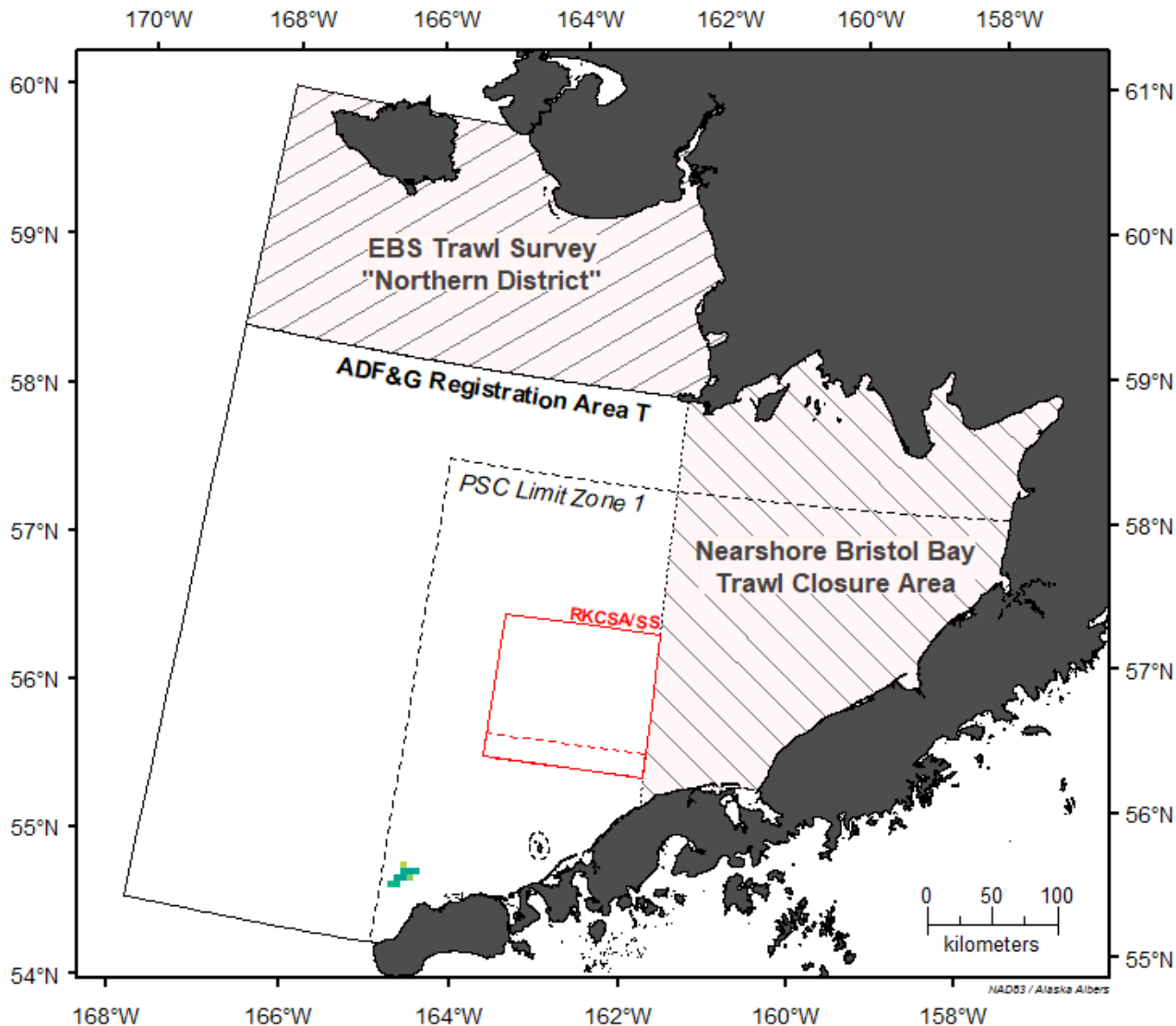
SA, km²



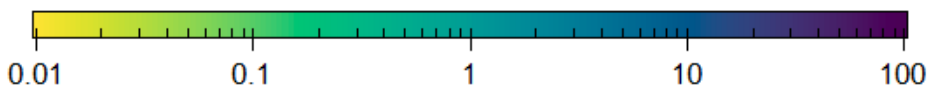
March 2004: Total Swept Area (SA), by PTR (2,859.4 km²)



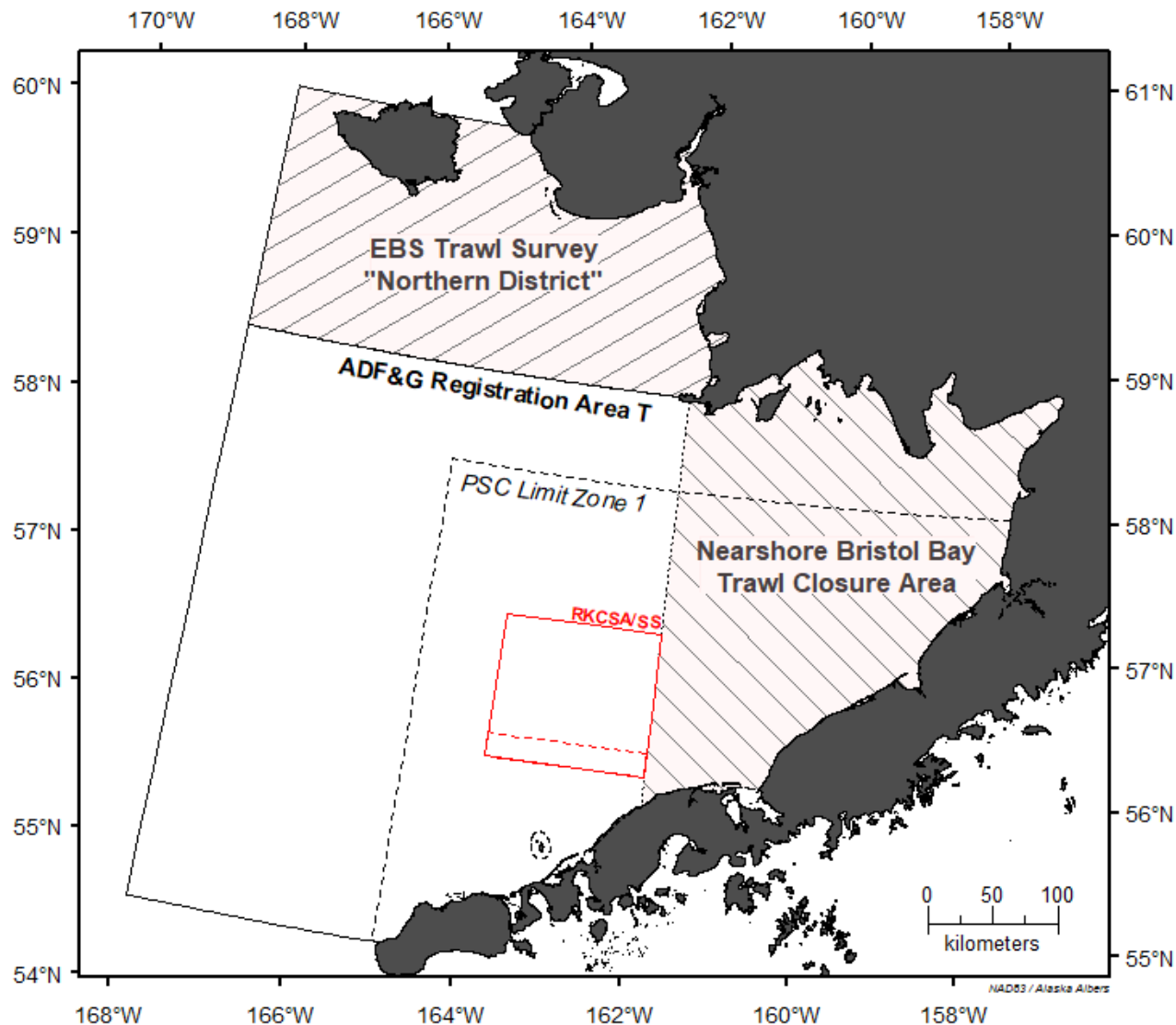
April 2004: Total Swept Area (SA), by PTR (8 km²)



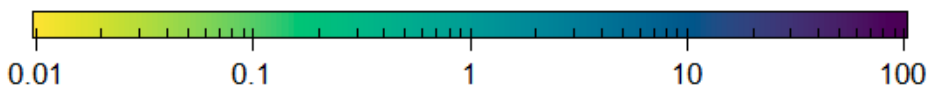
SA, km²



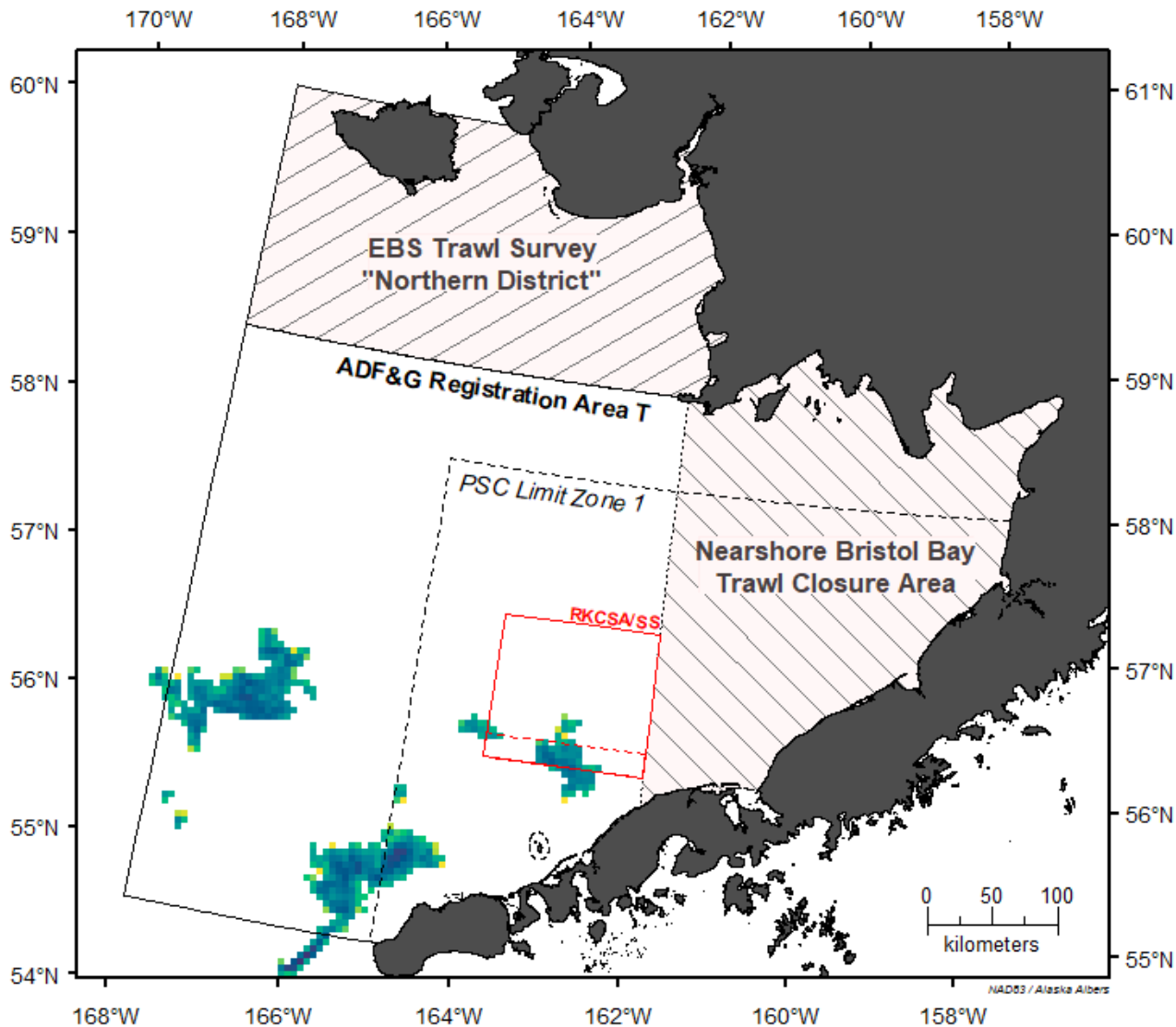
May 2004: Total Swept Area (SA), by PTR (0 km²)



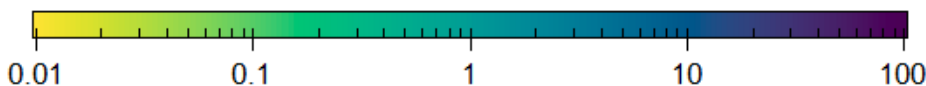
SA, km²



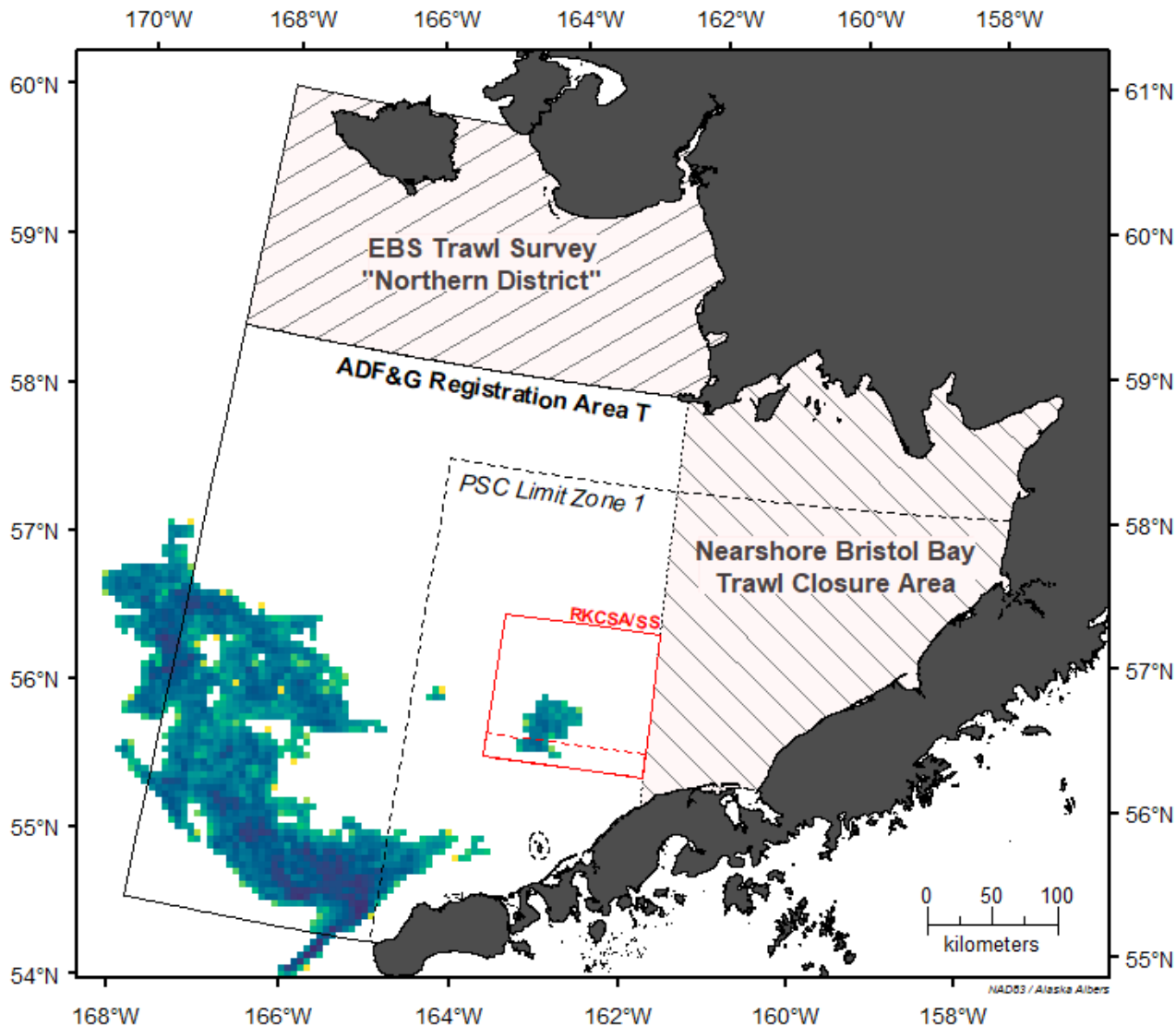
June 2004: Total Swept Area (SA), by PTR (1,791.2 km²)



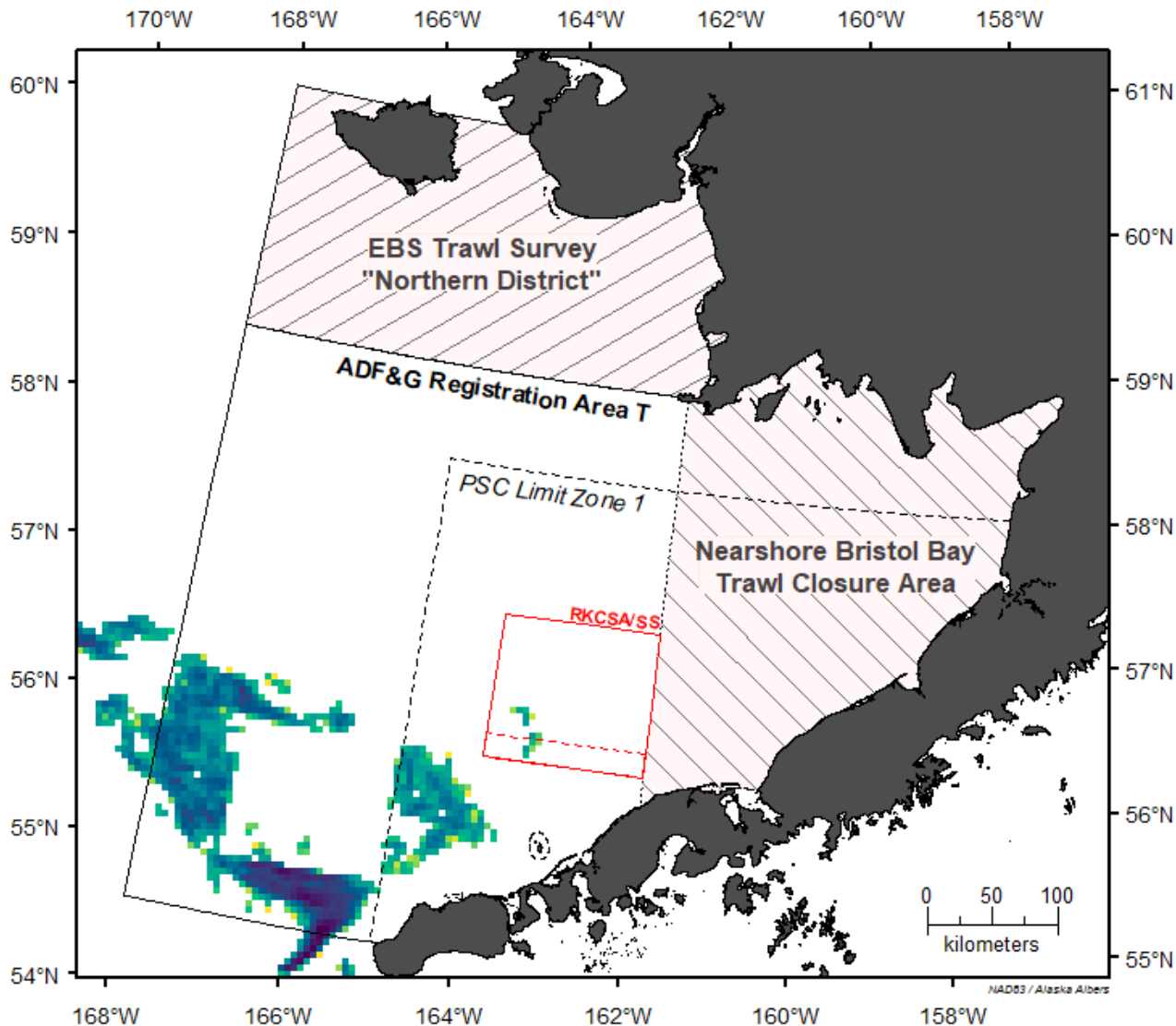
SA, km²



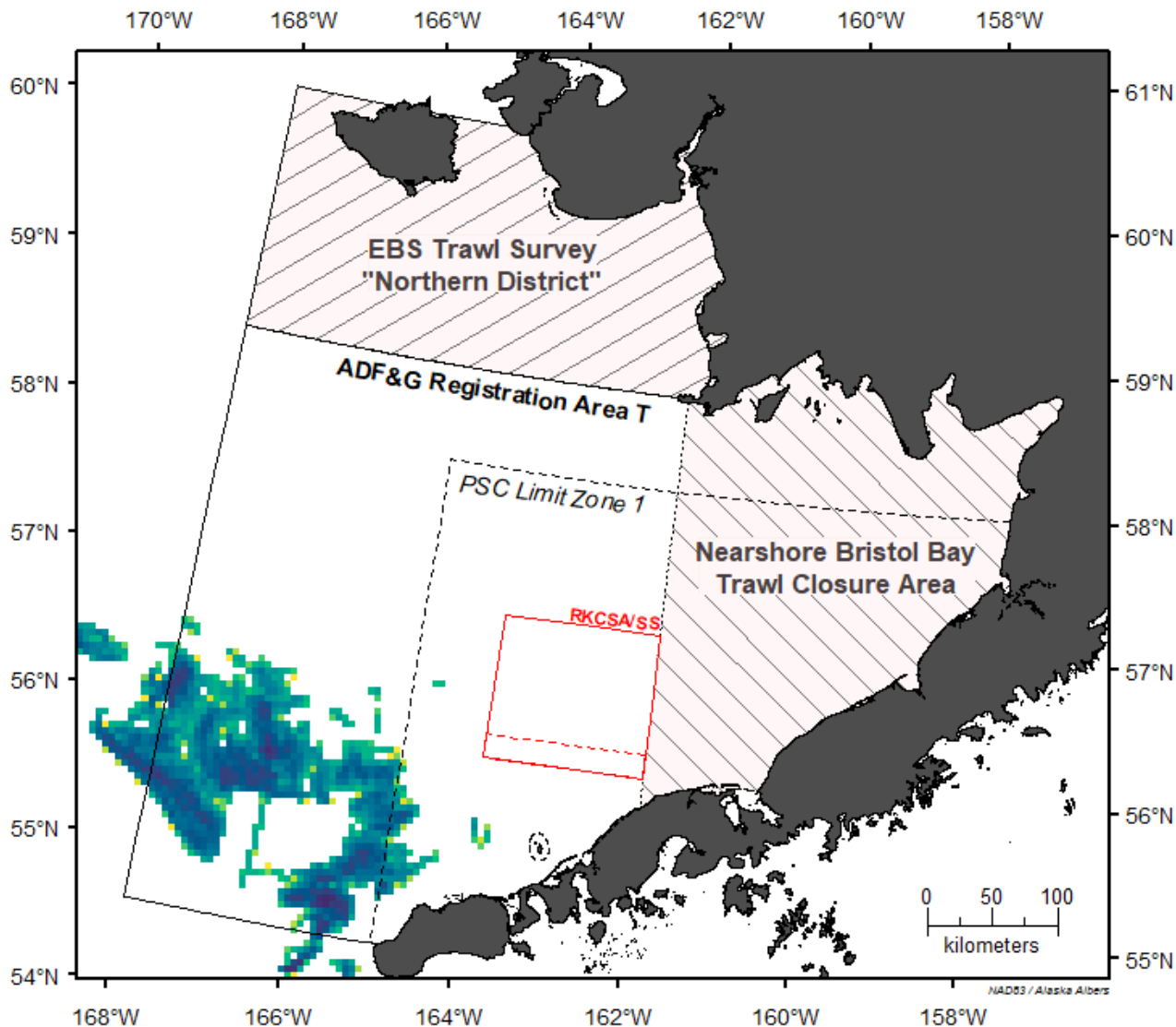
July 2004: Total Swept Area (SA), by PTR (7,008.2 km²)



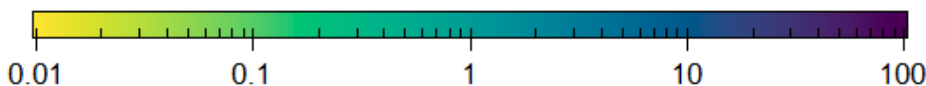
August 2004: Total Swept Area (SA), by PTR (5,713.7 km²)



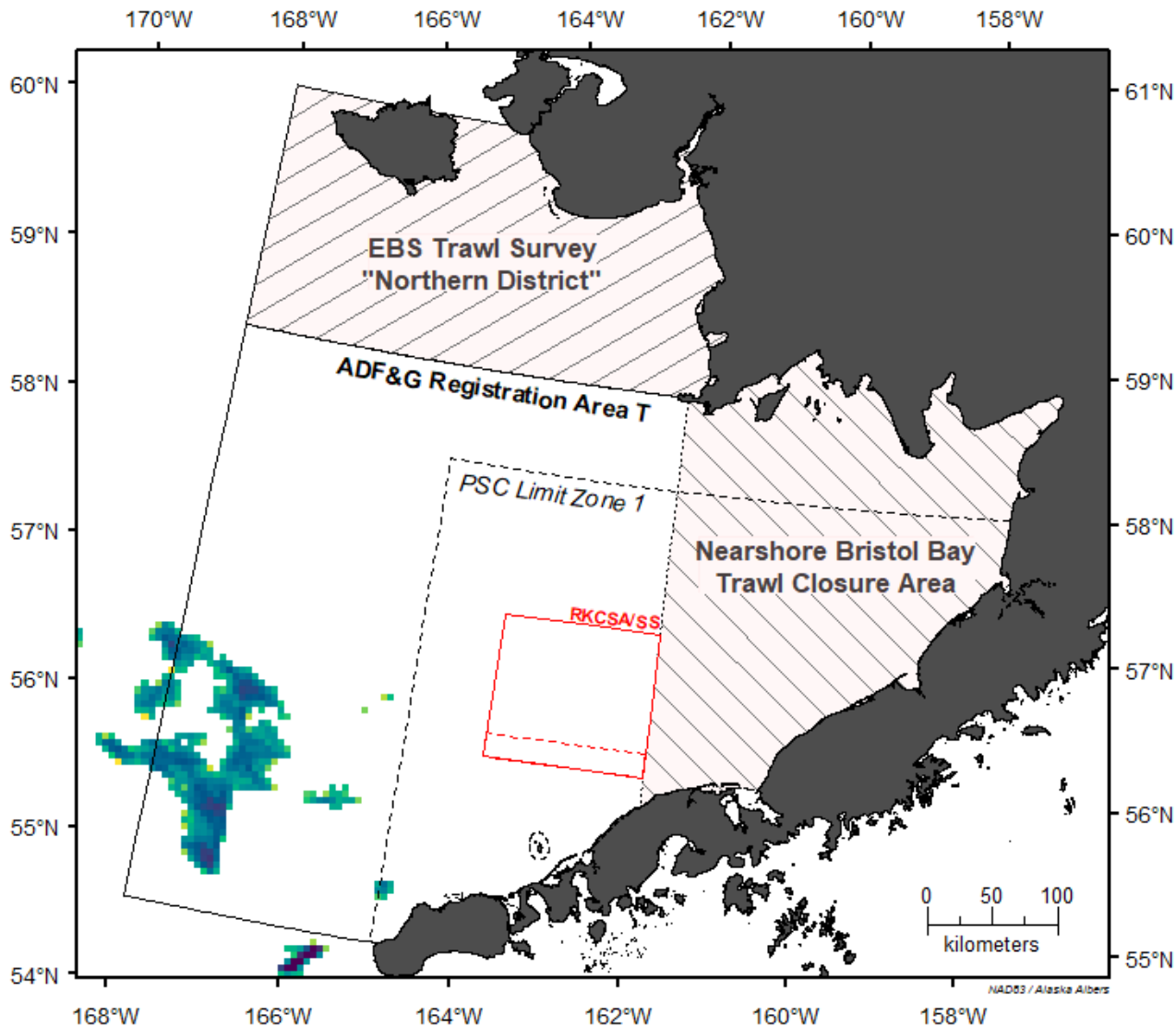
September 2004: Total Swept Area (SA), by PTR (5,097.2 km²)



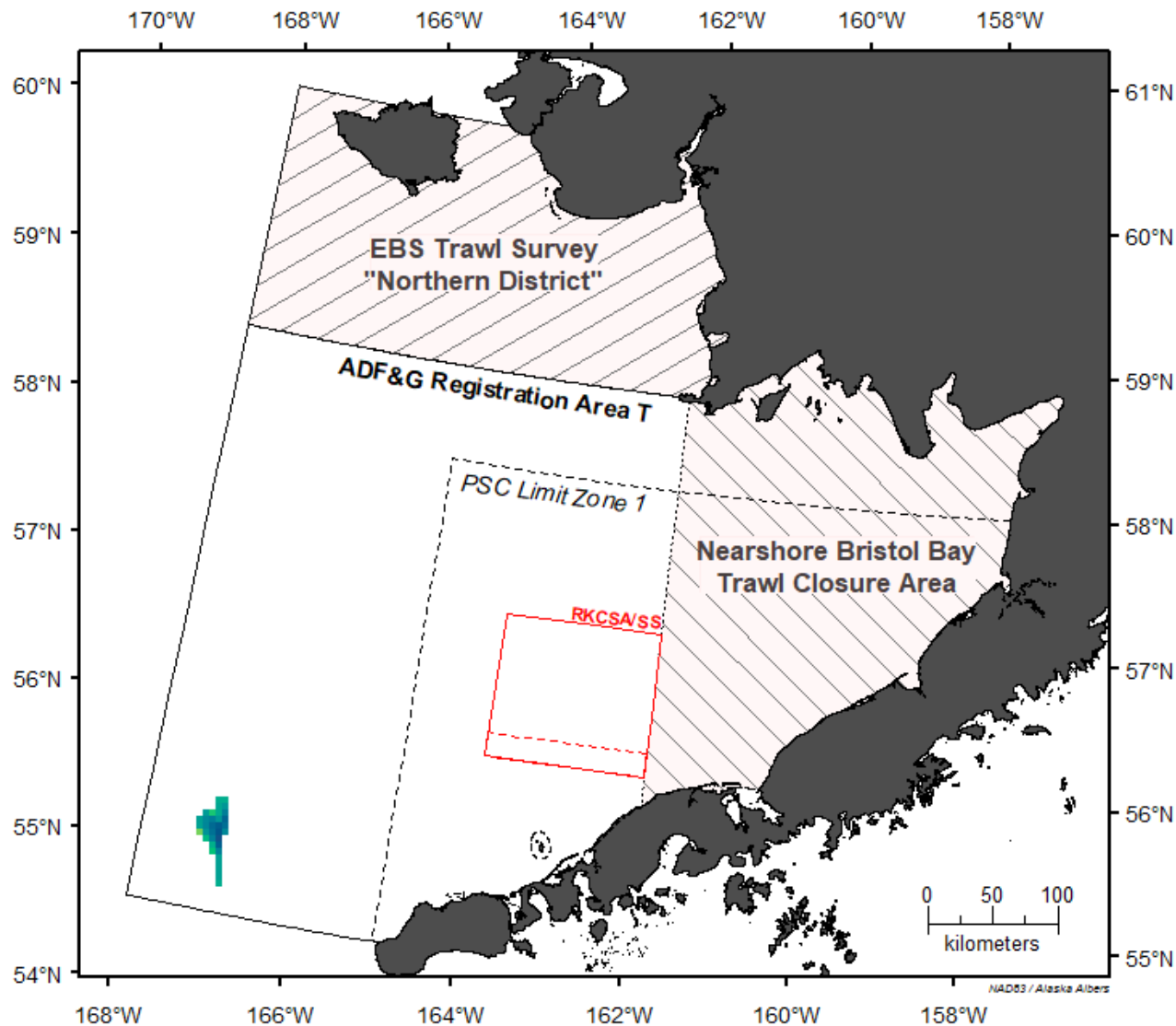
SA, km²



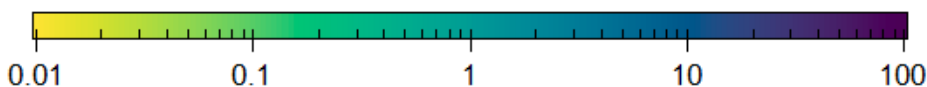
October 2004: Total Swept Area (SA), by PTR (1,419.8 km²)



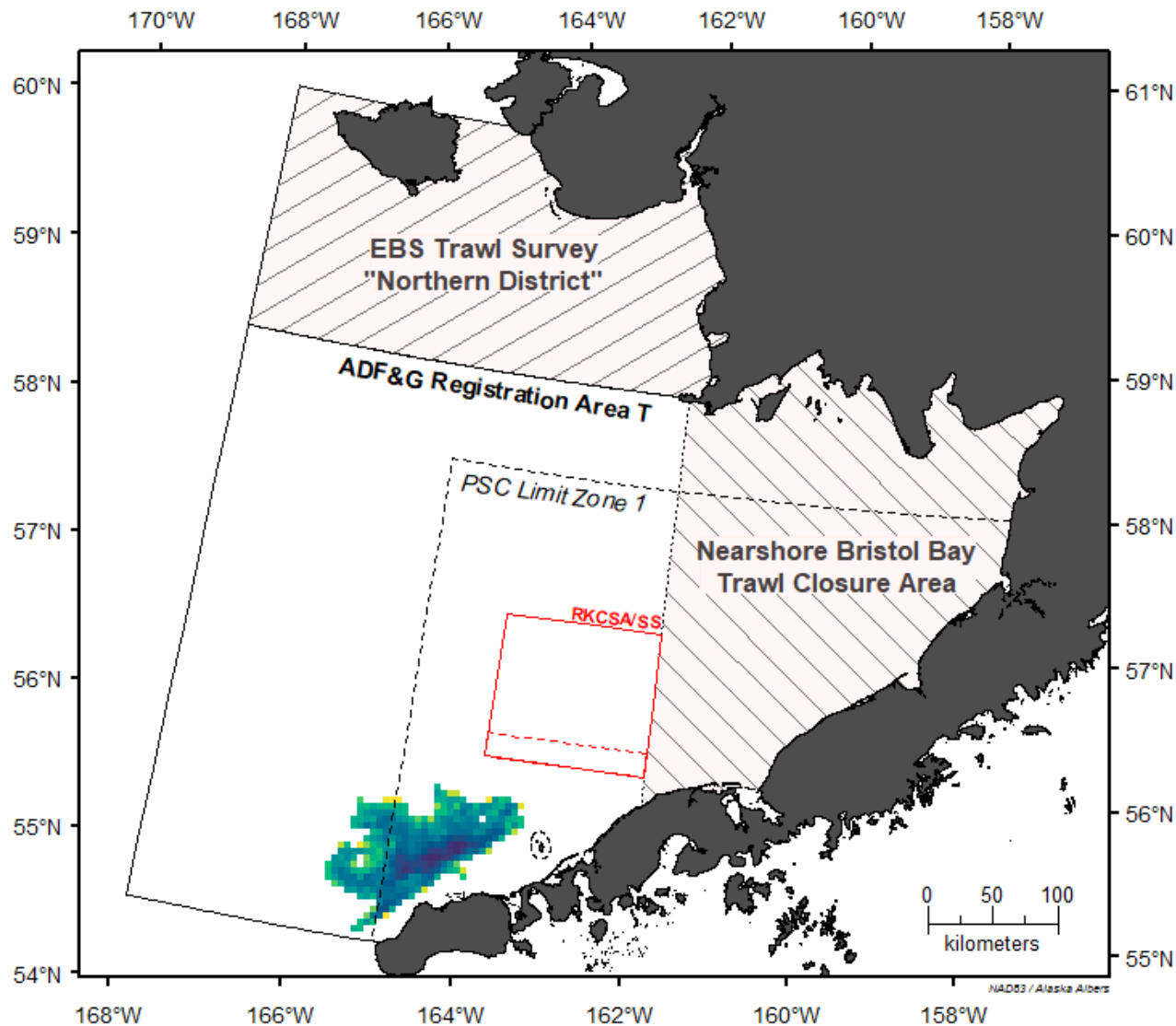
November 2004: Total Swept Area (SA), by PTR (92.9 km²)



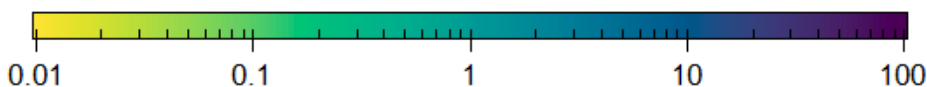
SA, km²



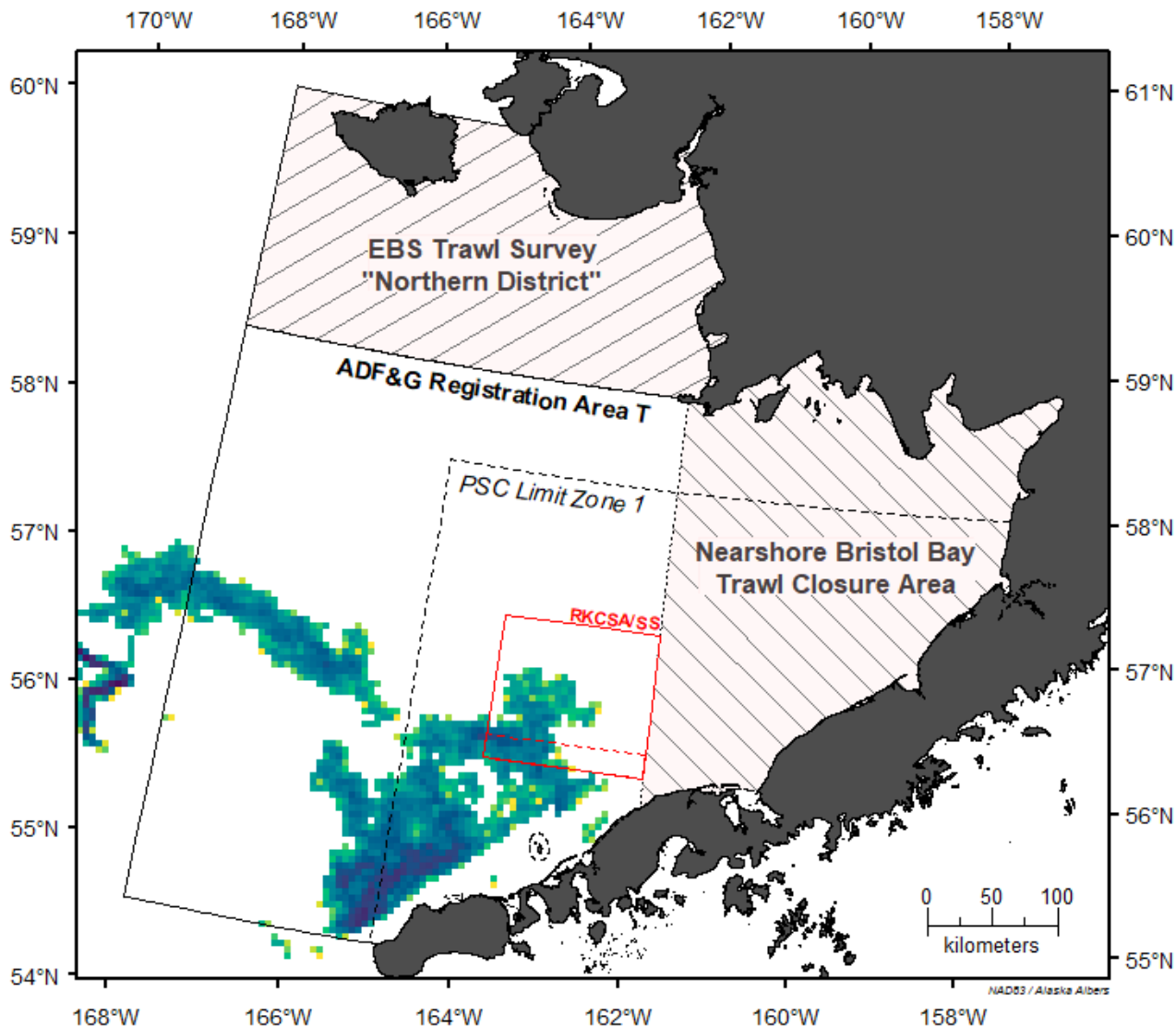
January 2005: Total Swept Area (SA), by PTR (3,058.3 km²)



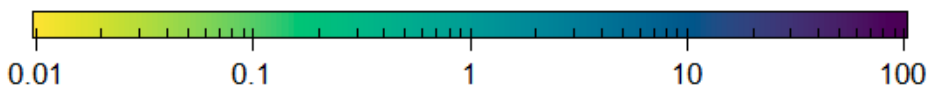
SA, km²



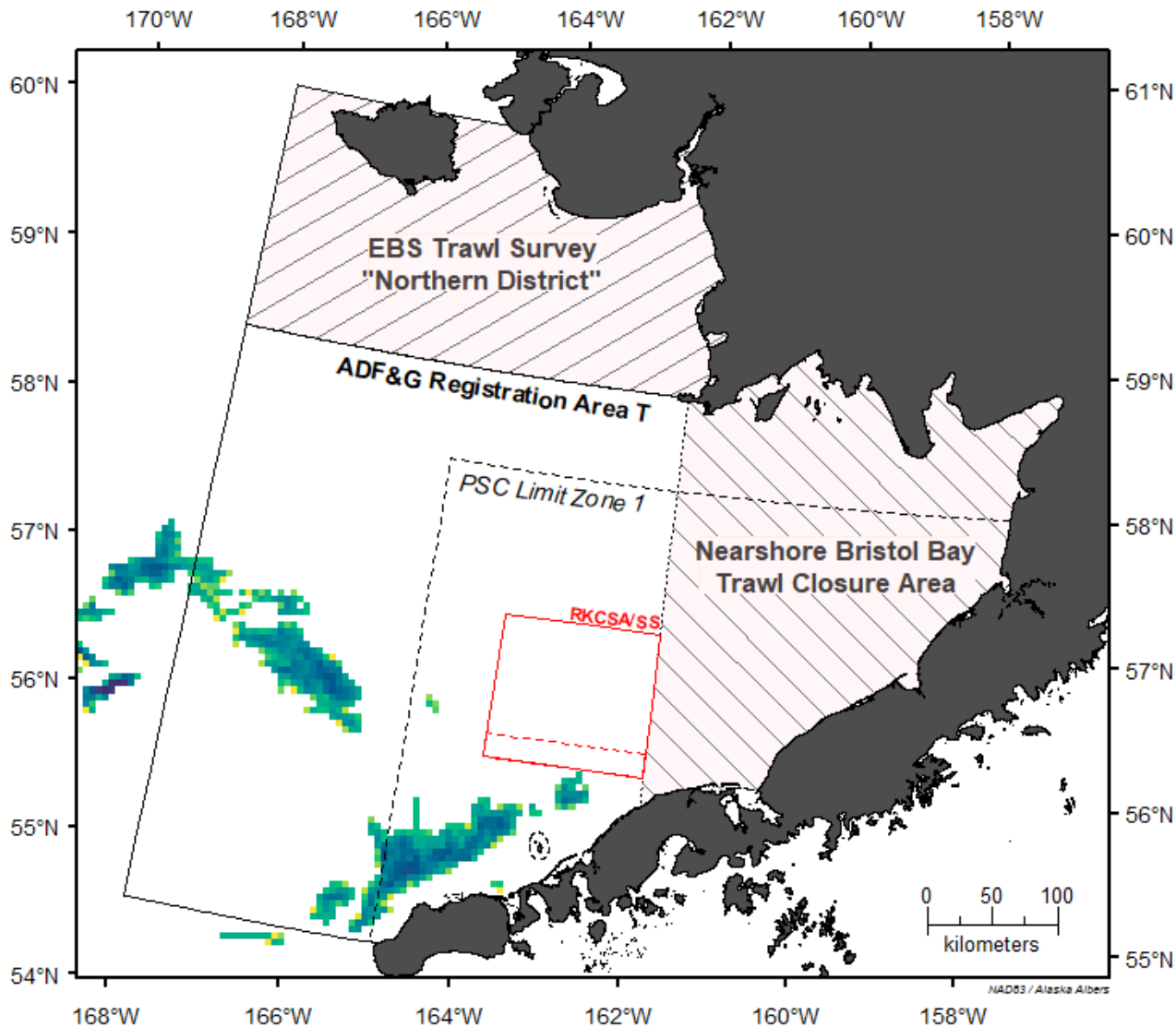
February 2005: Total Swept Area (SA), by PTR (7,706.6 km²)



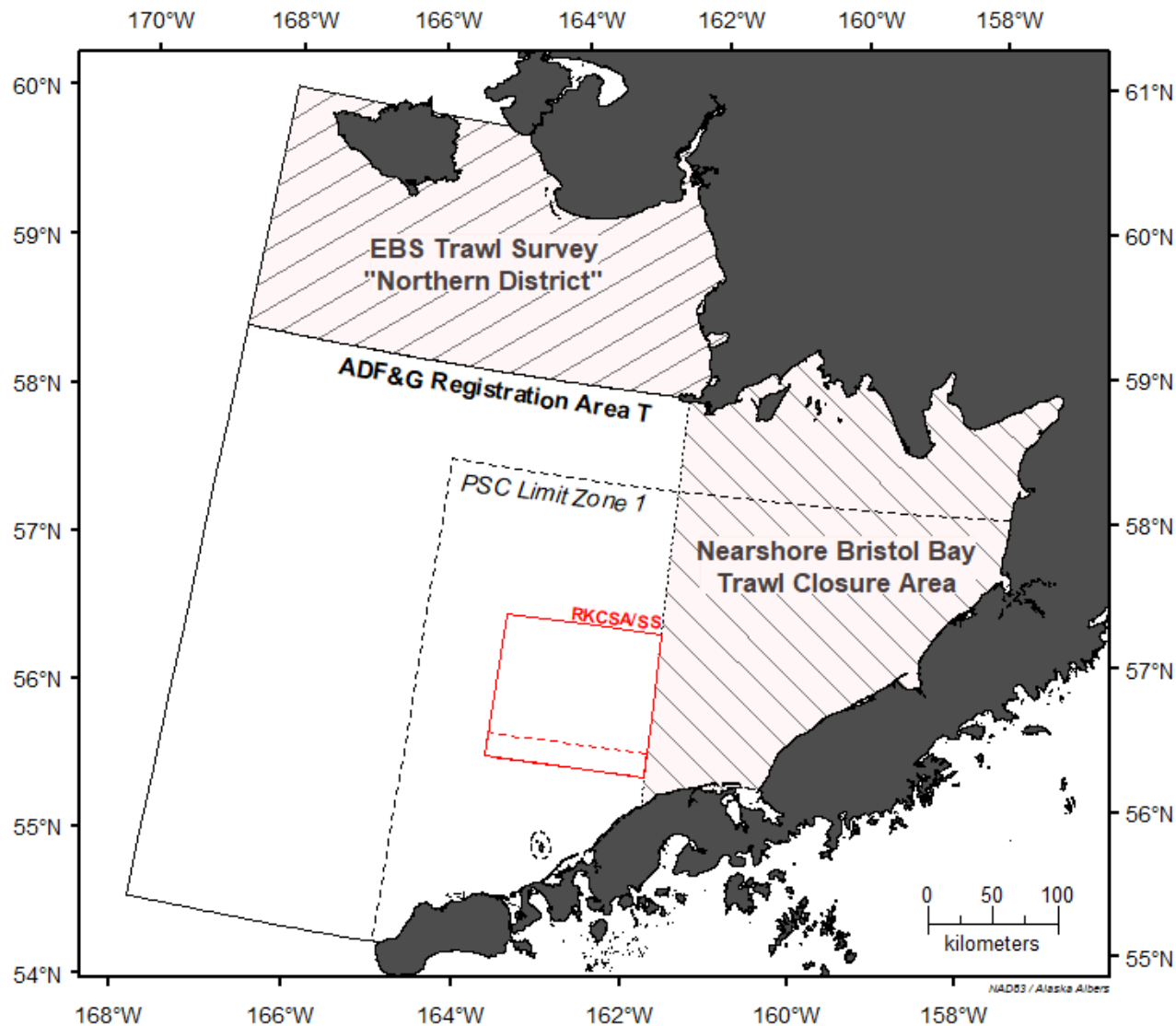
SA, km²



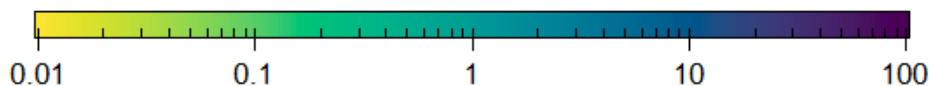
March 2005: Total Swept Area (SA), by PTR (1,480.9 km²)



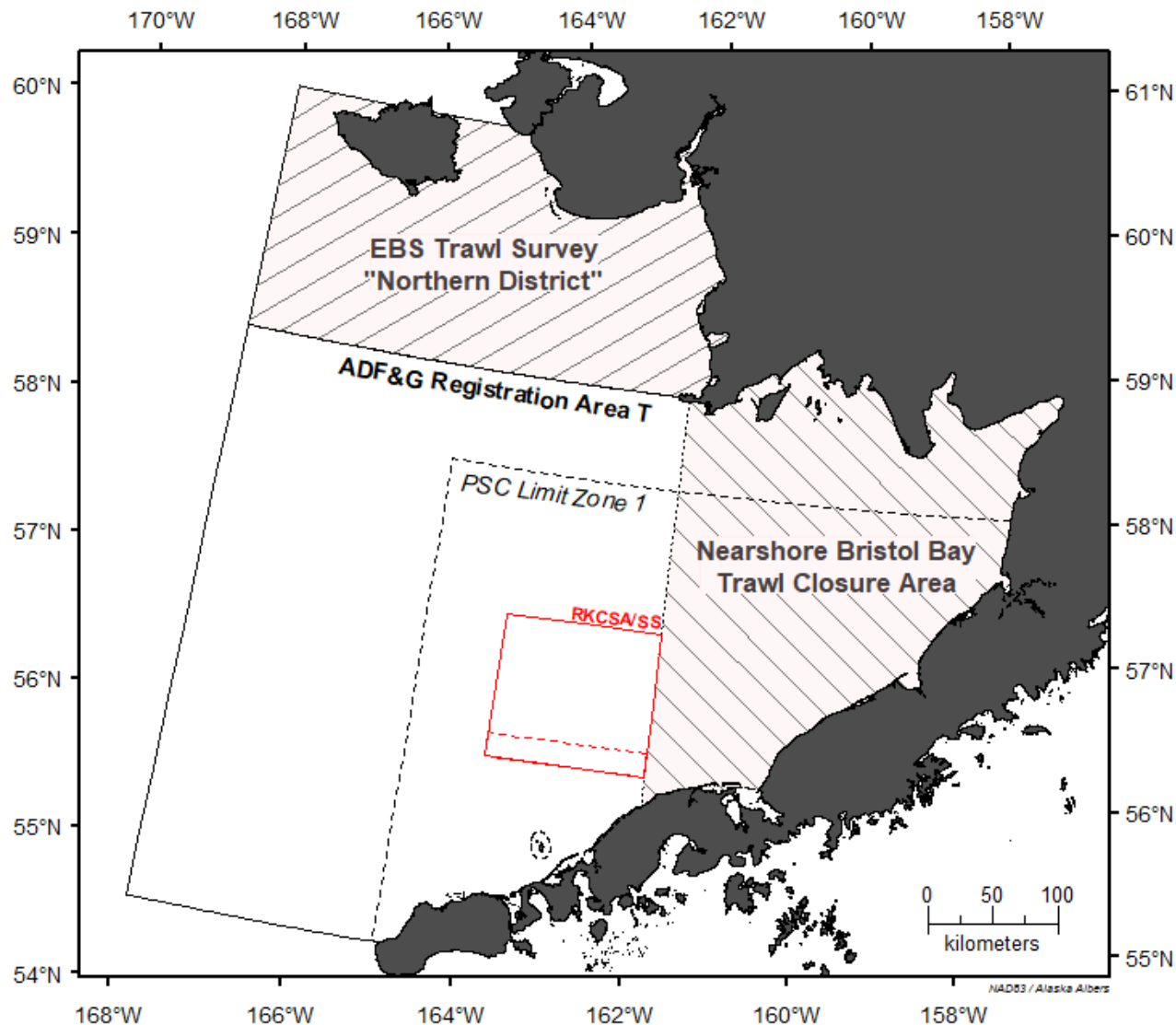
April 2005: Total Swept Area (SA), by PTR (0 km²)



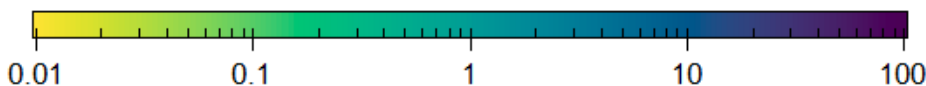
SA, km²



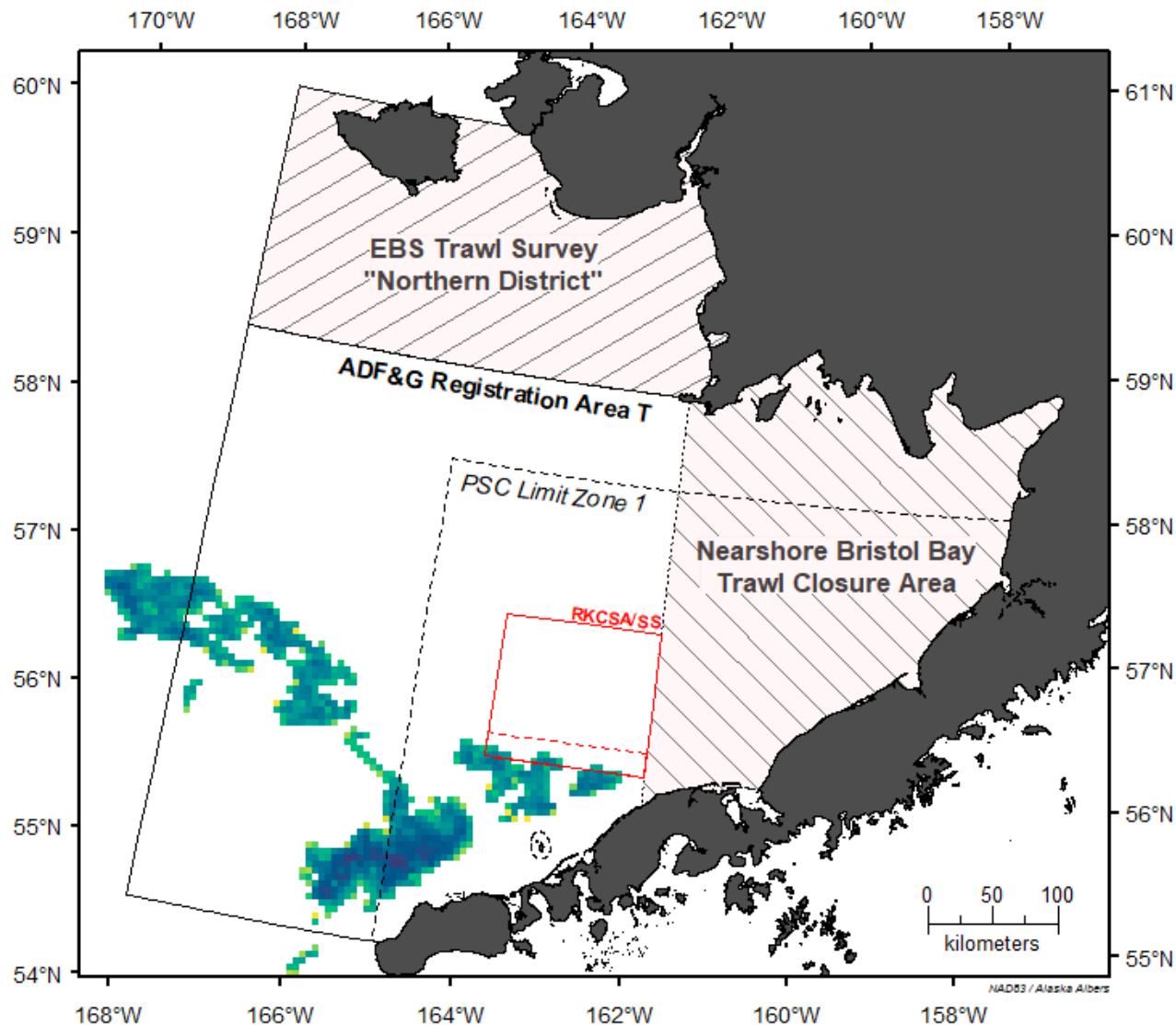
May 2005: Total Swept Area (SA), by PTR (0 km²)



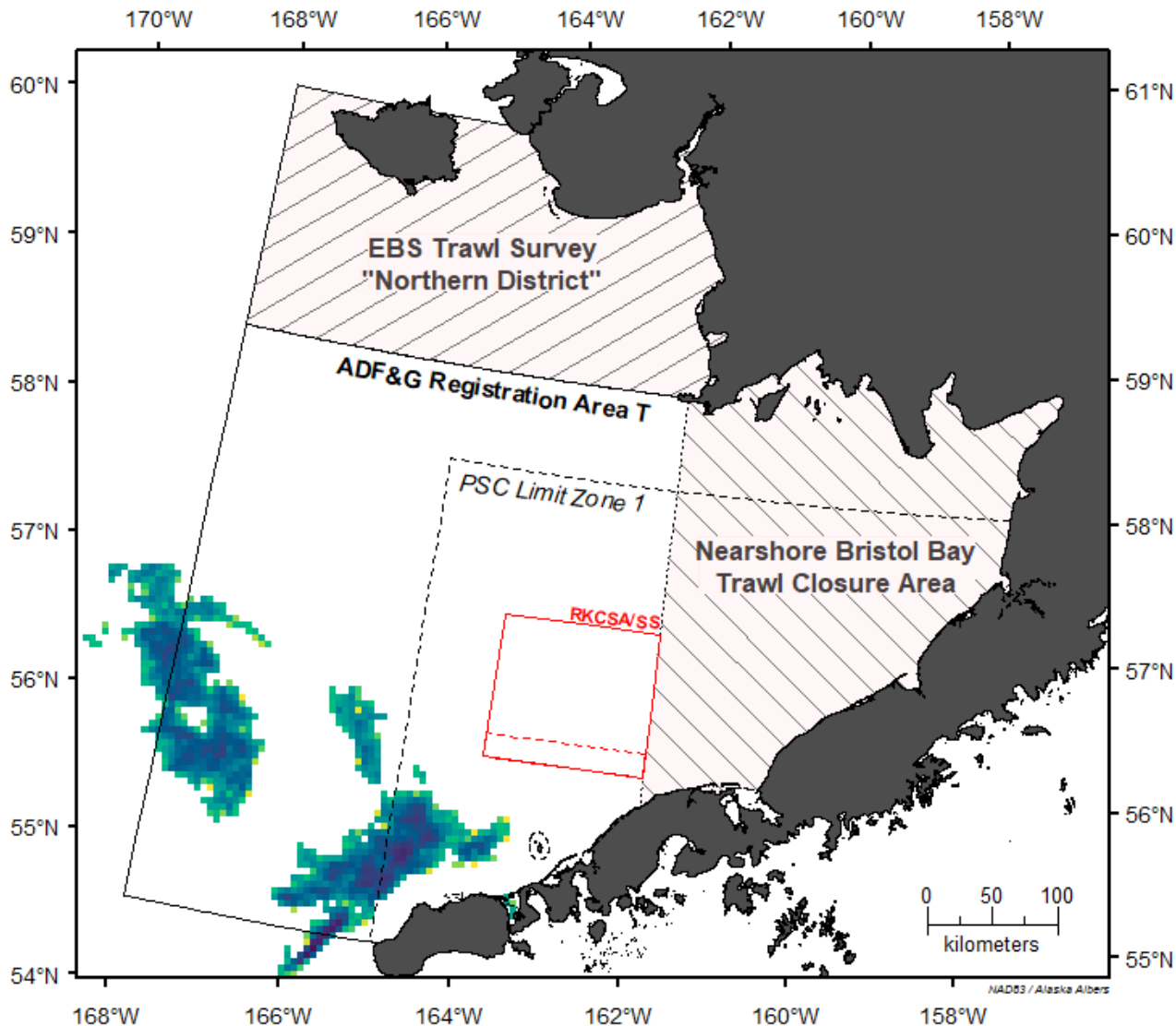
SA, km²



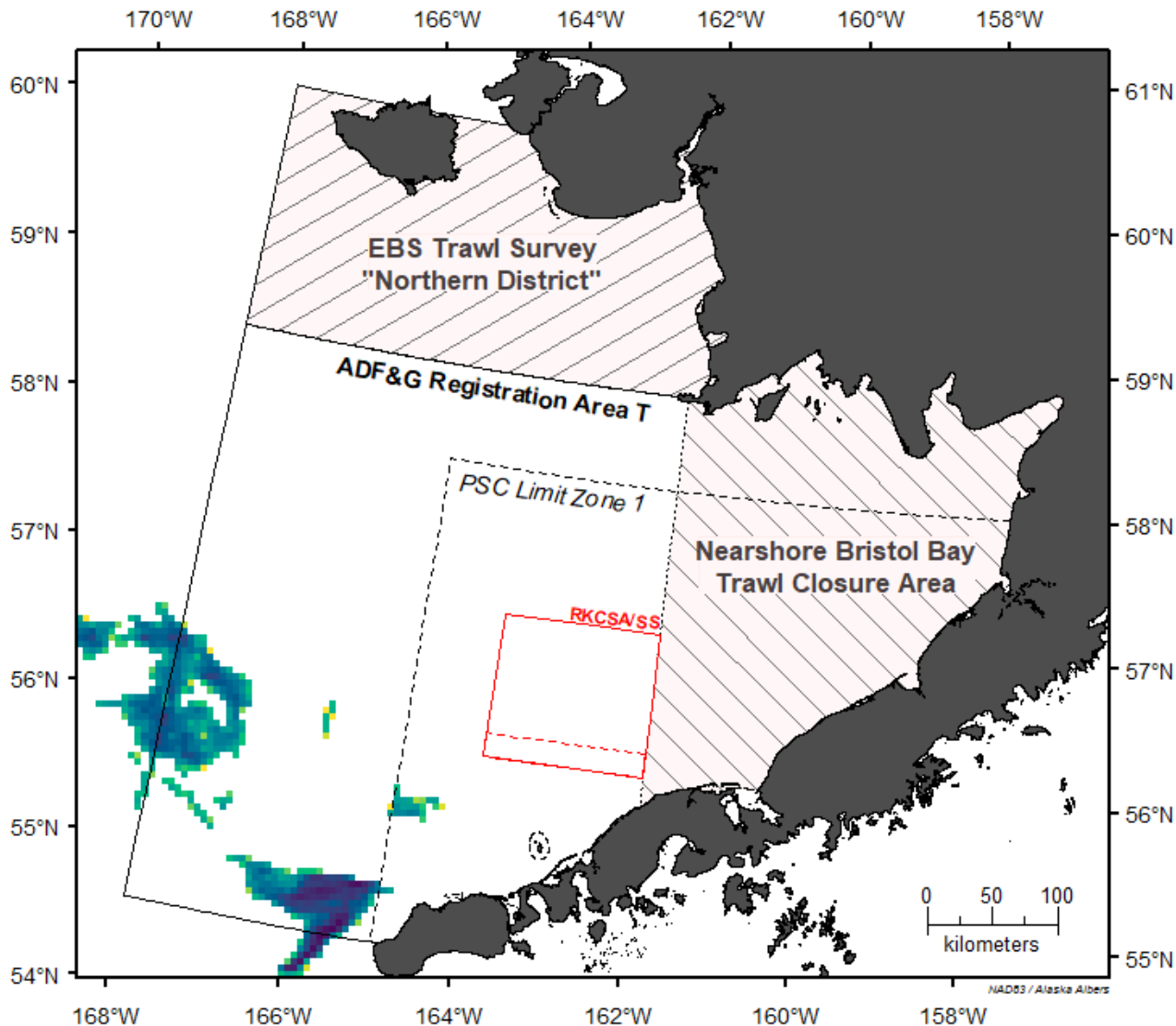
June 2005: Total Swept Area (SA), by PTR (3,332.3 km²)



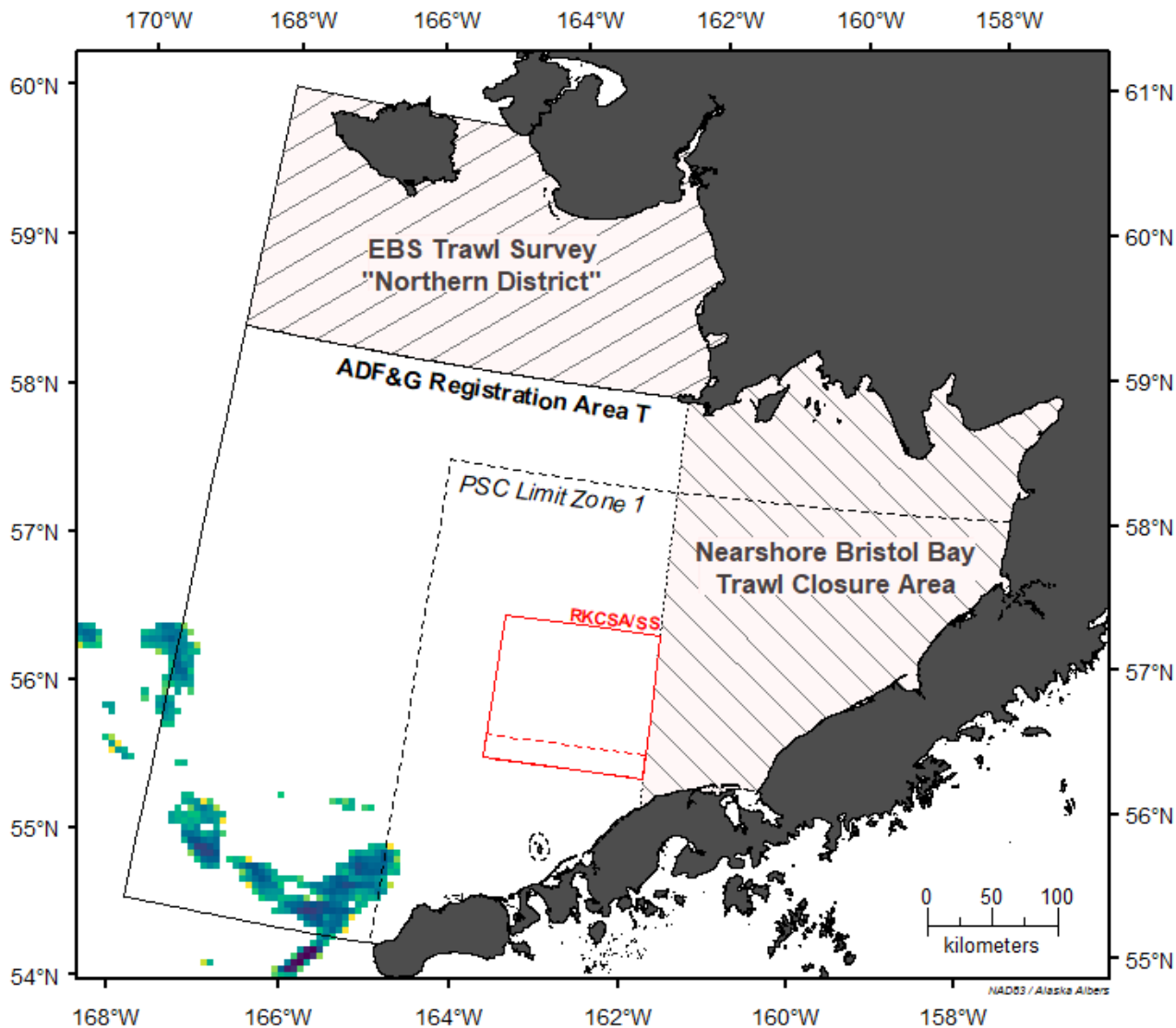
July 2005: Total Swept Area (SA), by PTR (5,862.3 km²)



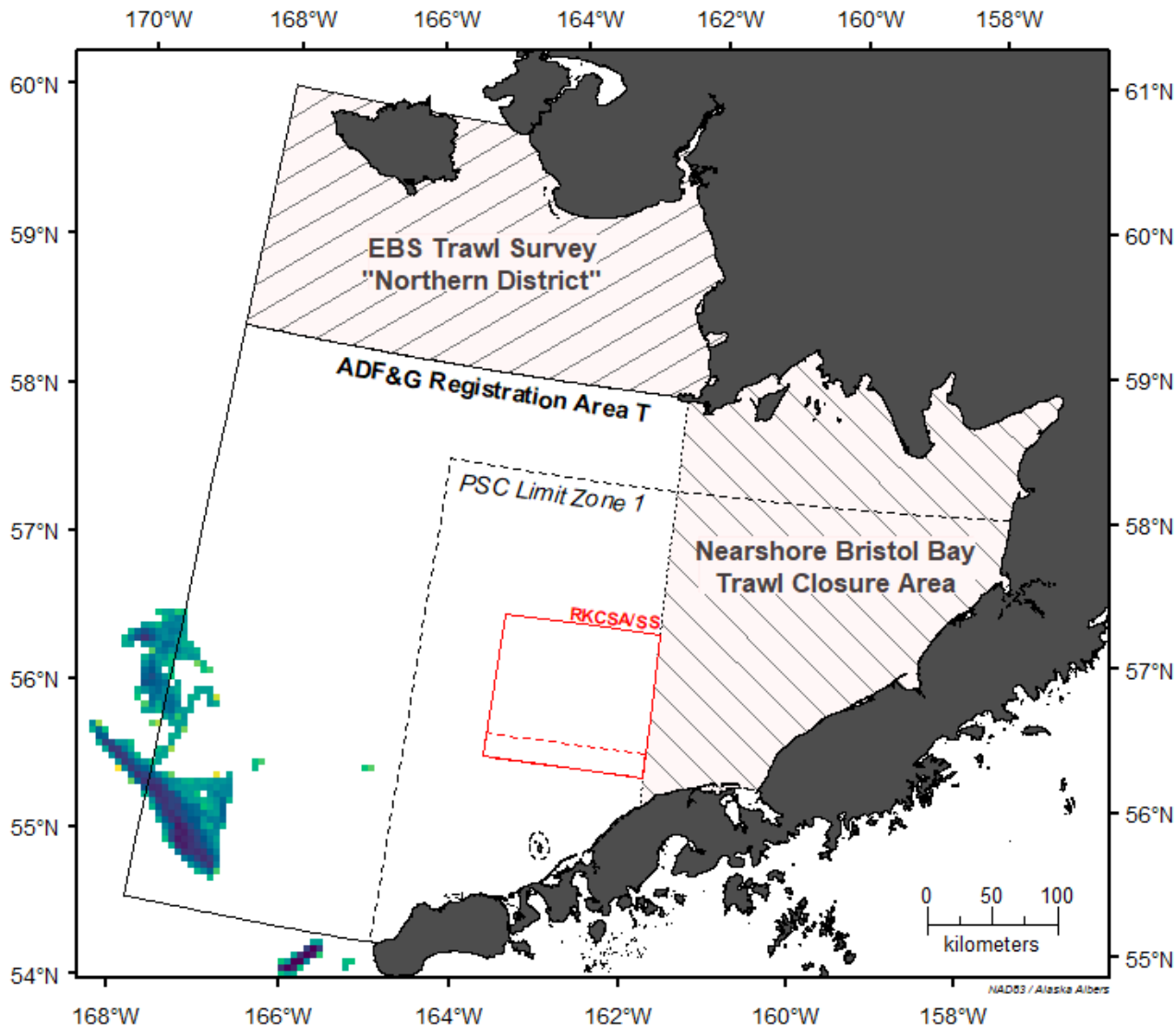
August 2005: Total Swept Area (SA), by PTR (3,595.6 km²)



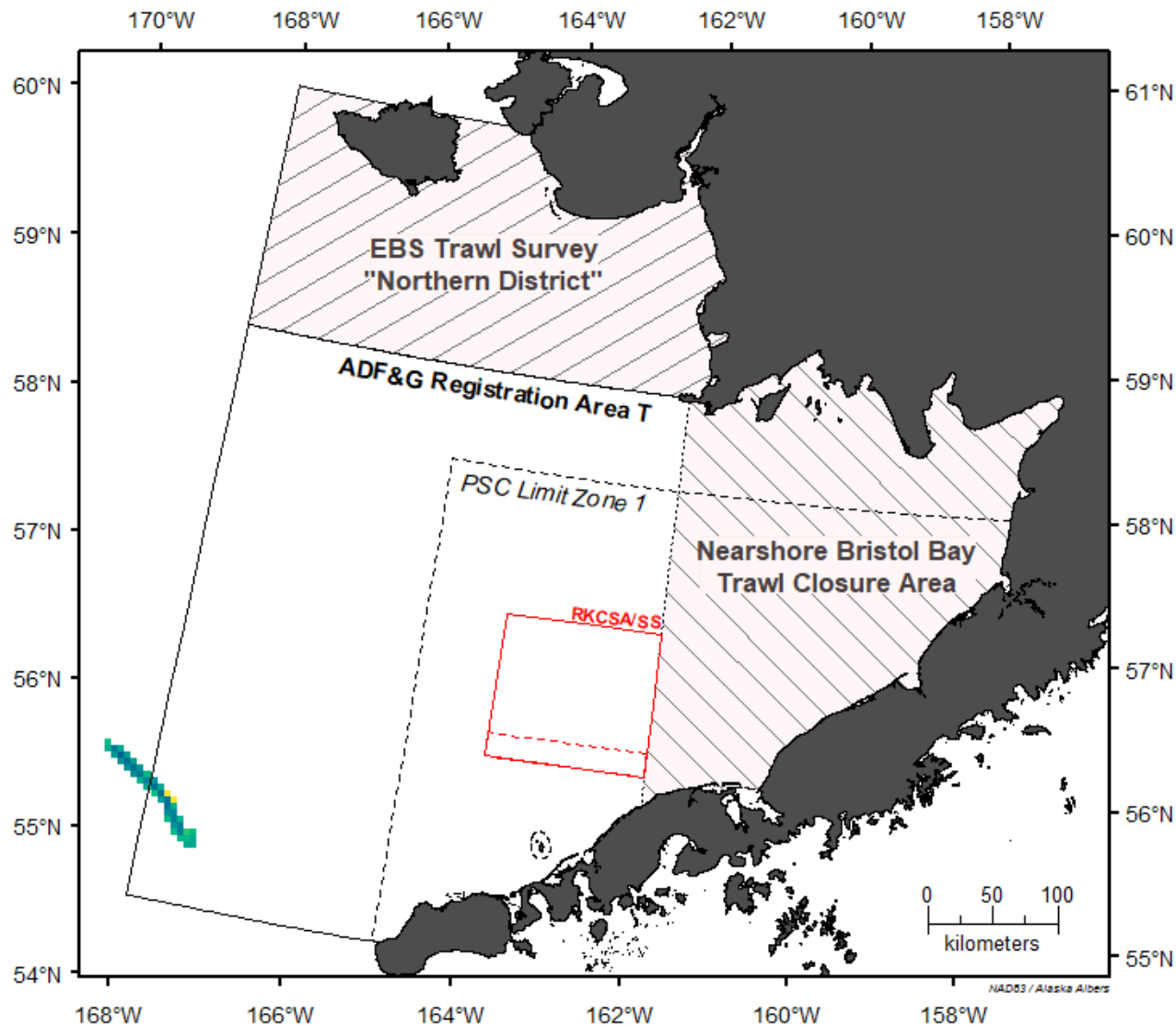
September 2005: Total Swept Area (SA), by PTR (1,128.8 km²)



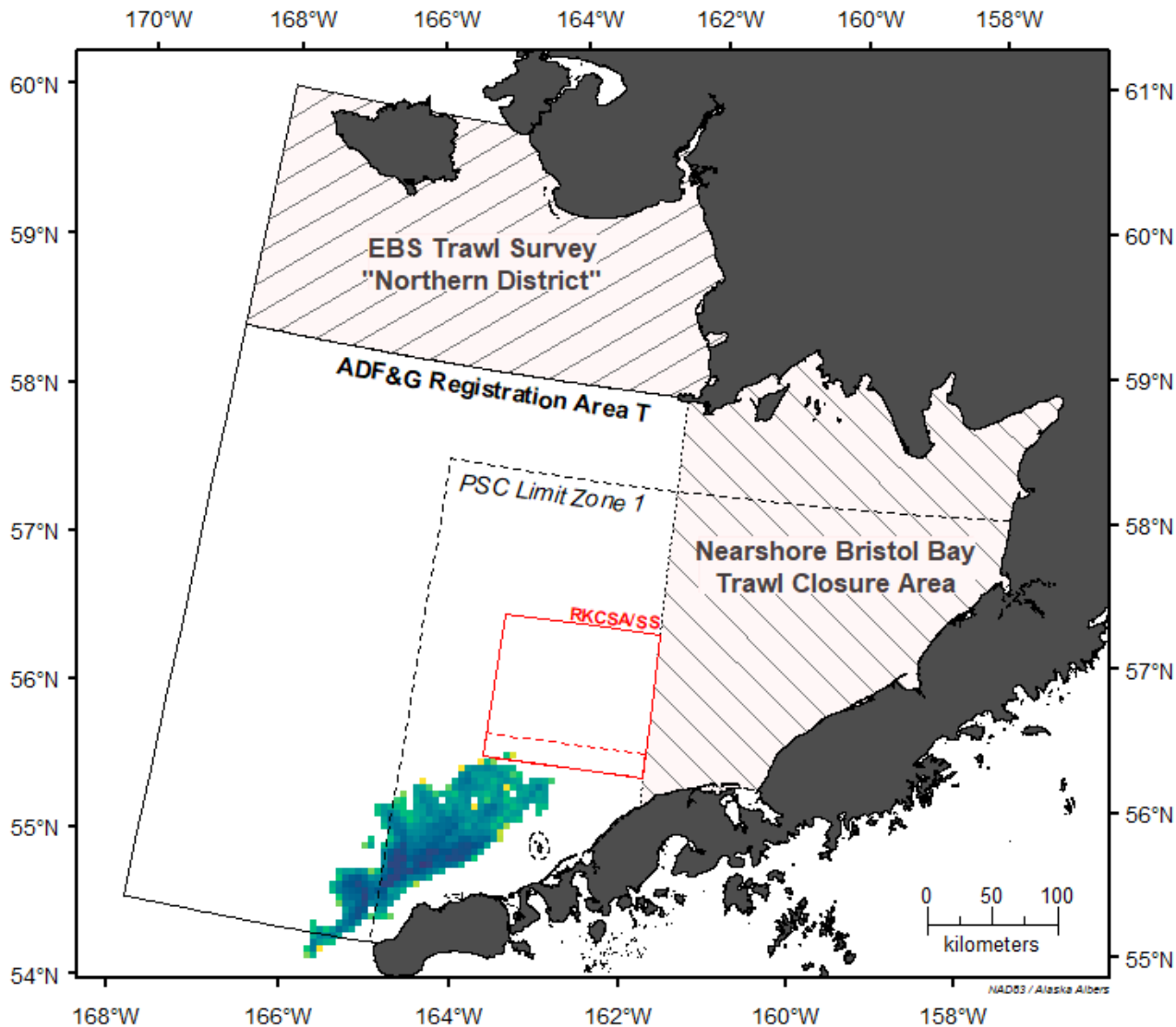
October 2005: Total Swept Area (SA), by PTR (1,847.7 km²)



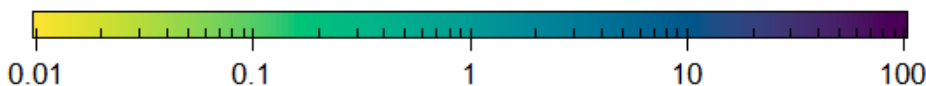
November 2005: Total Swept Area (SA), by PTR (43.8 km²)



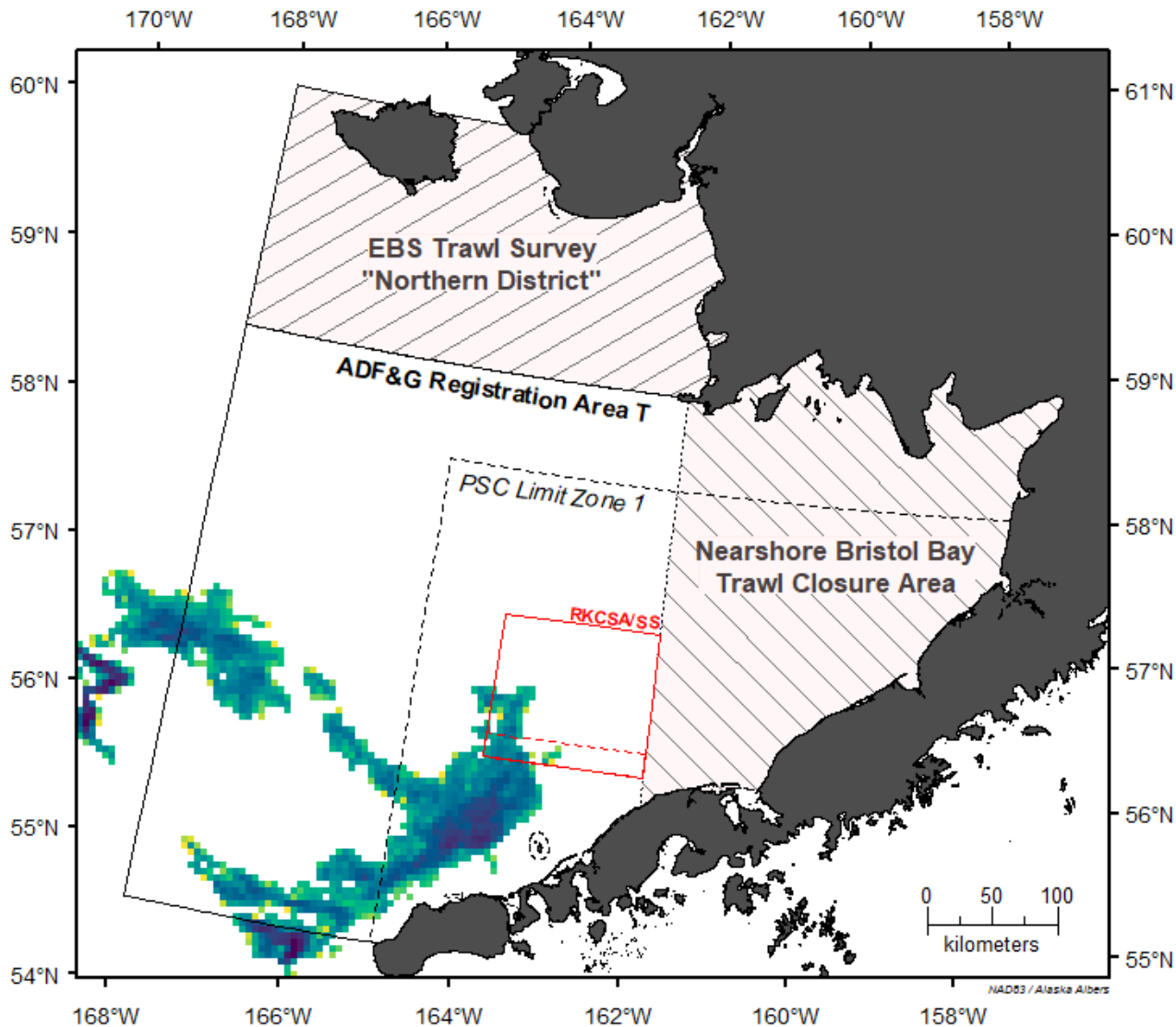
January 2006: Total Swept Area (SA), by PTR (2,777.5 km²)



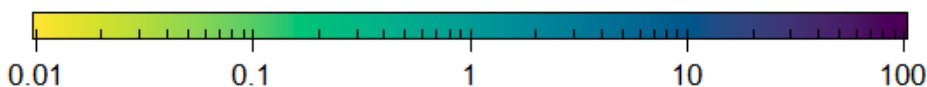
SA, km²



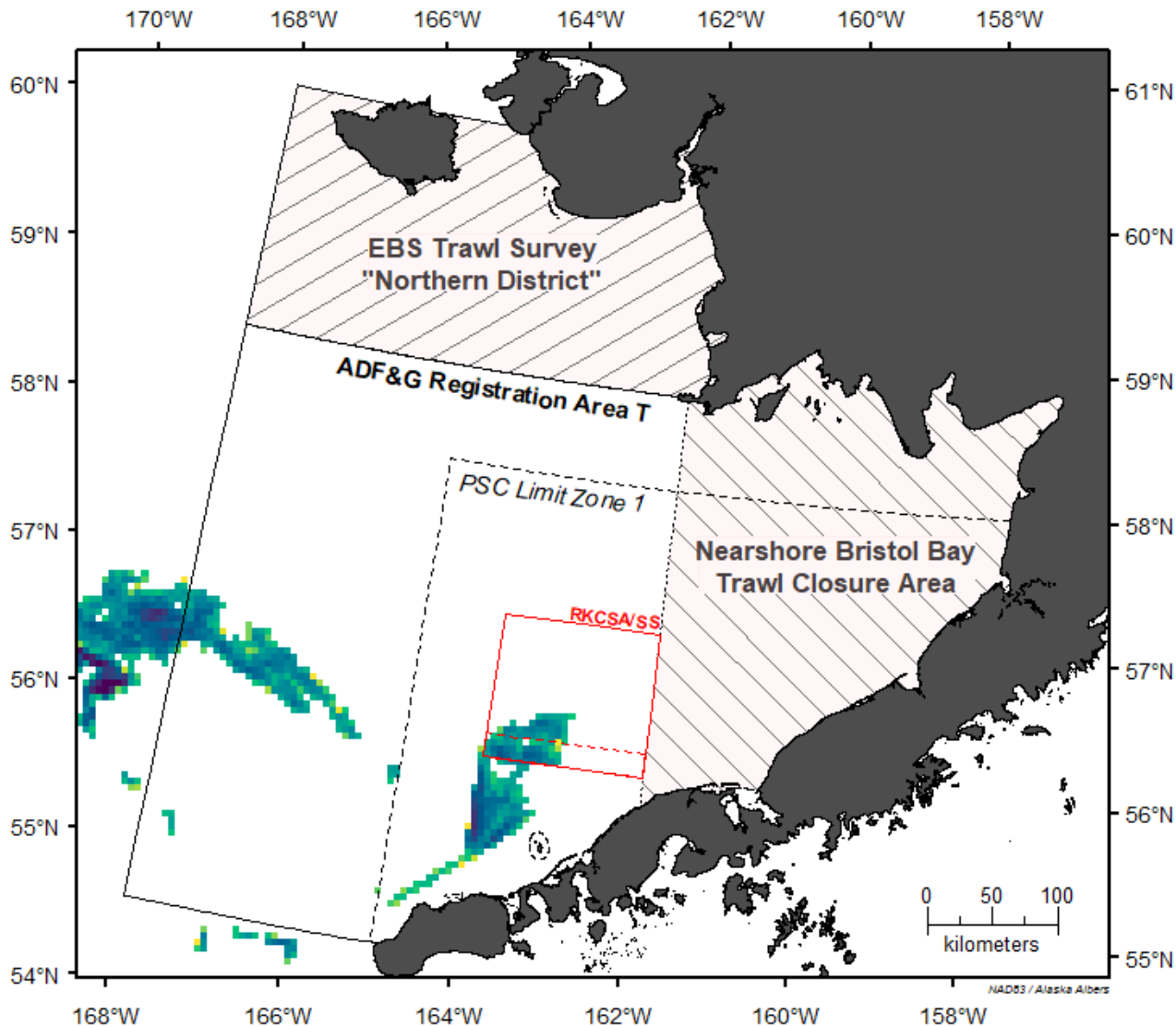
February 2006: Total Swept Area (SA), by PTR (6,362.8 km²)



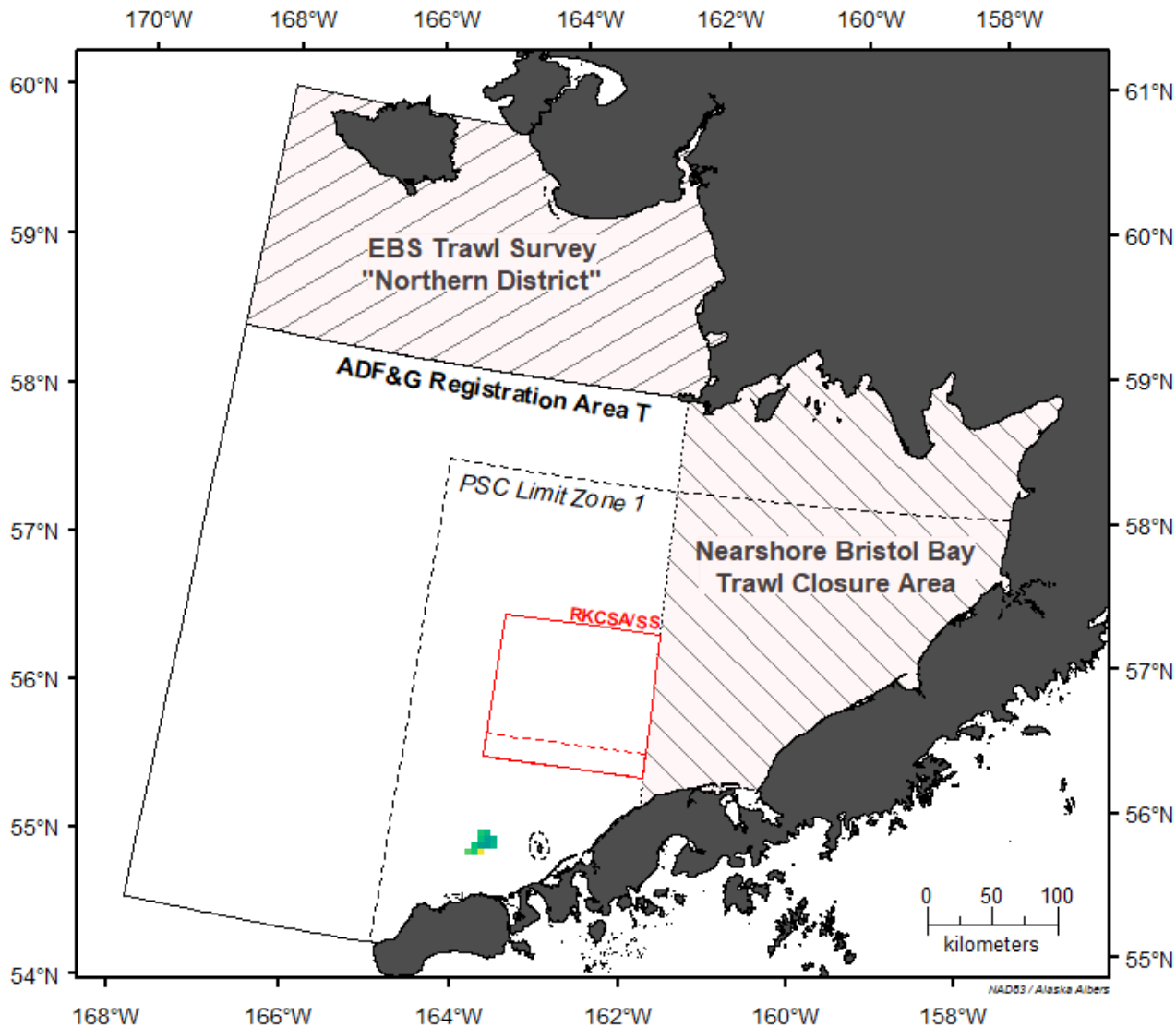
SA, km²



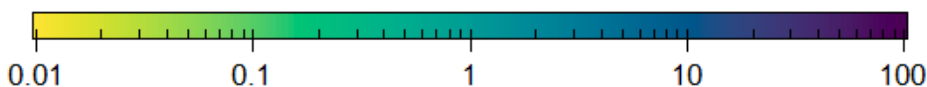
March 2006: Total Swept Area (SA), by PTR (2,073.2 km²)



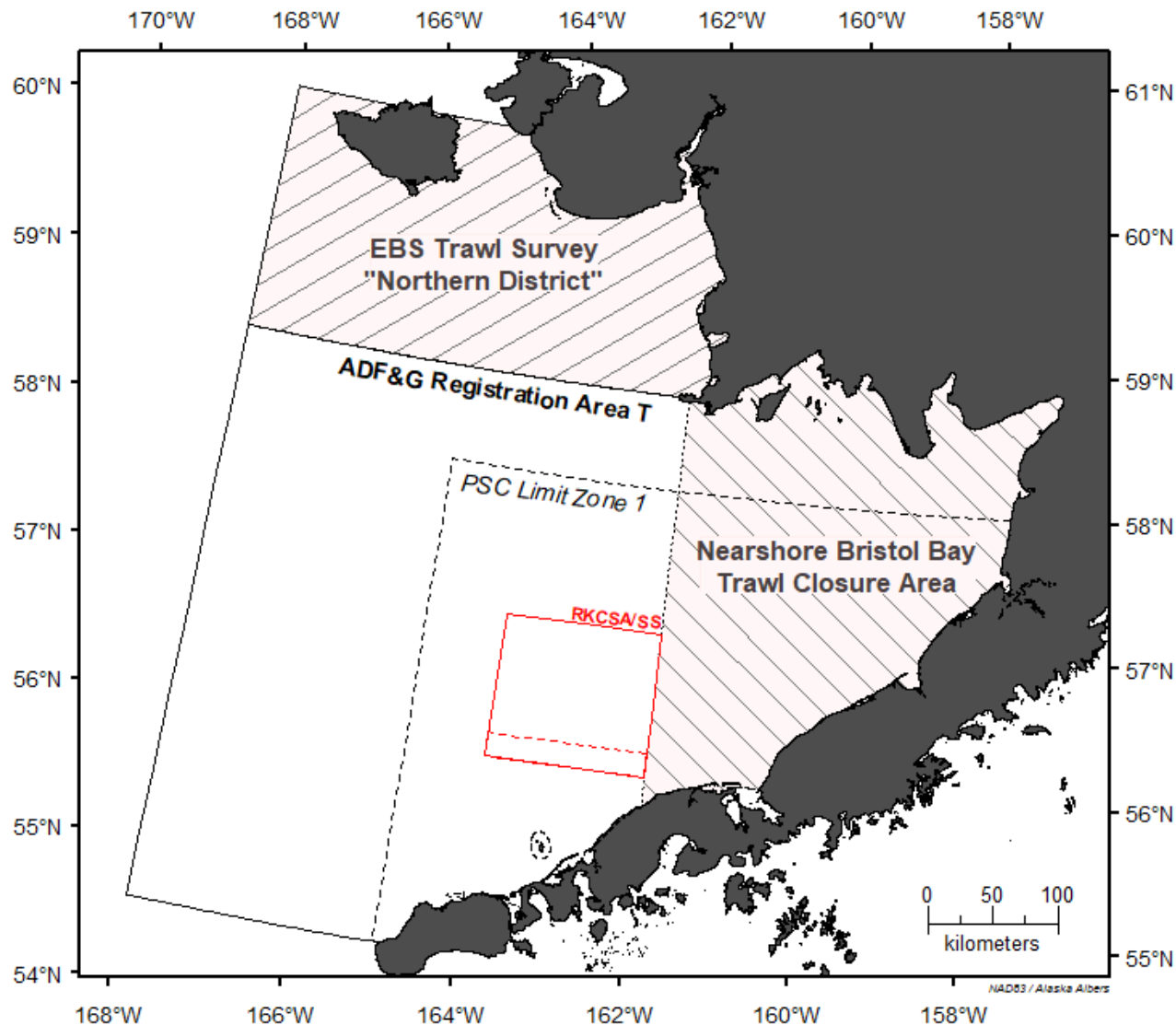
April 2006: Total Swept Area (SA), by PTR (9.1 km²)



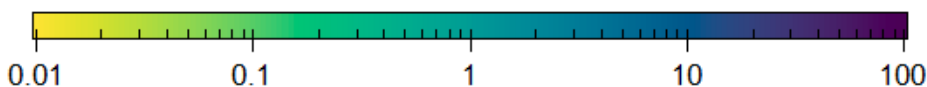
SA, km²



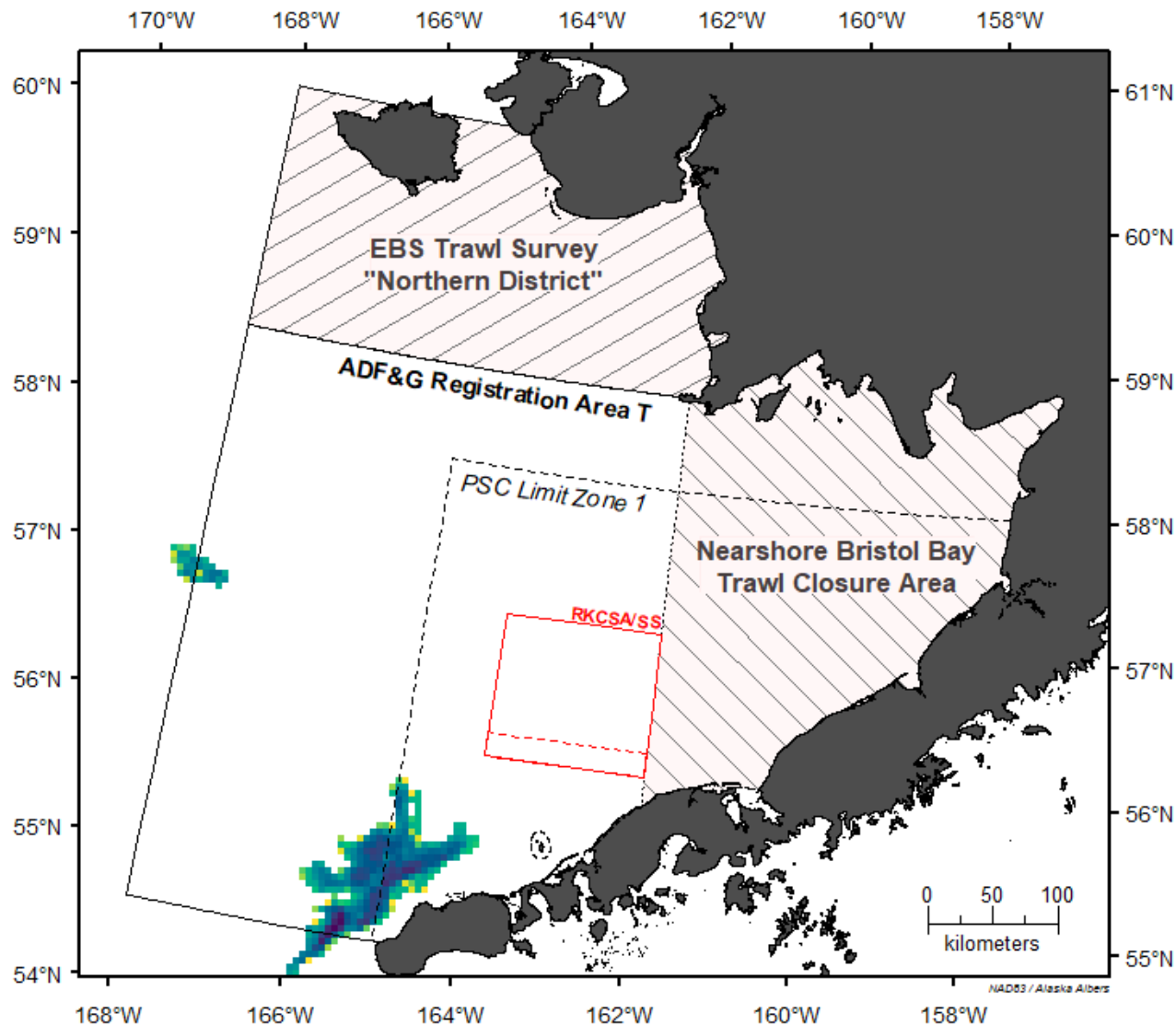
May 2006: Total Swept Area (SA), by PTR (0 km²)



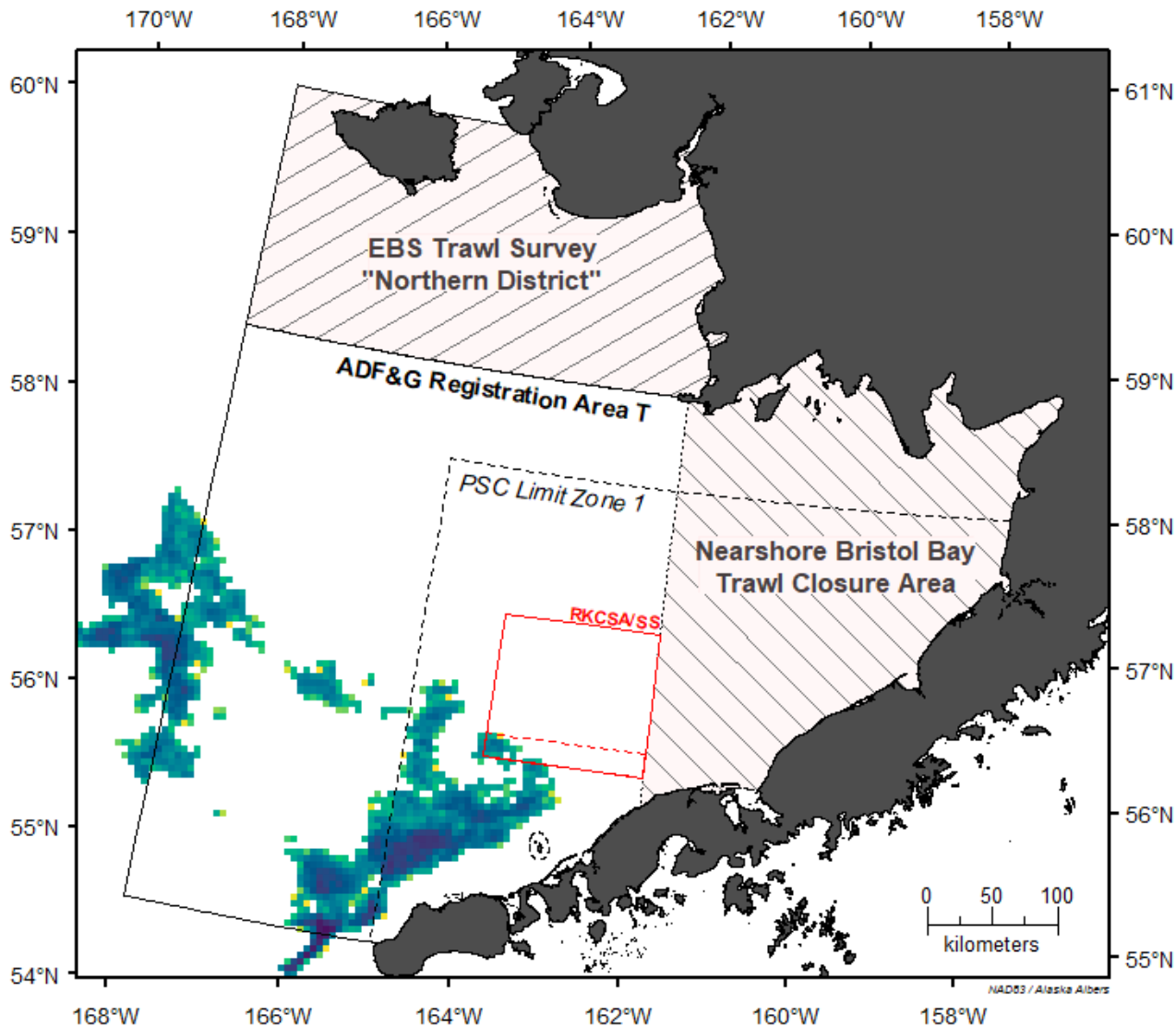
SA, km²



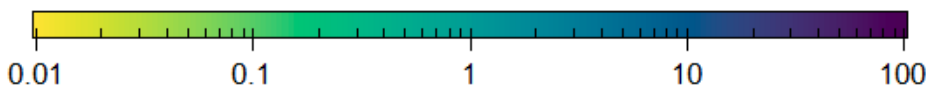
June 2006: Total Swept Area (SA), by PTR (2,927 km²)



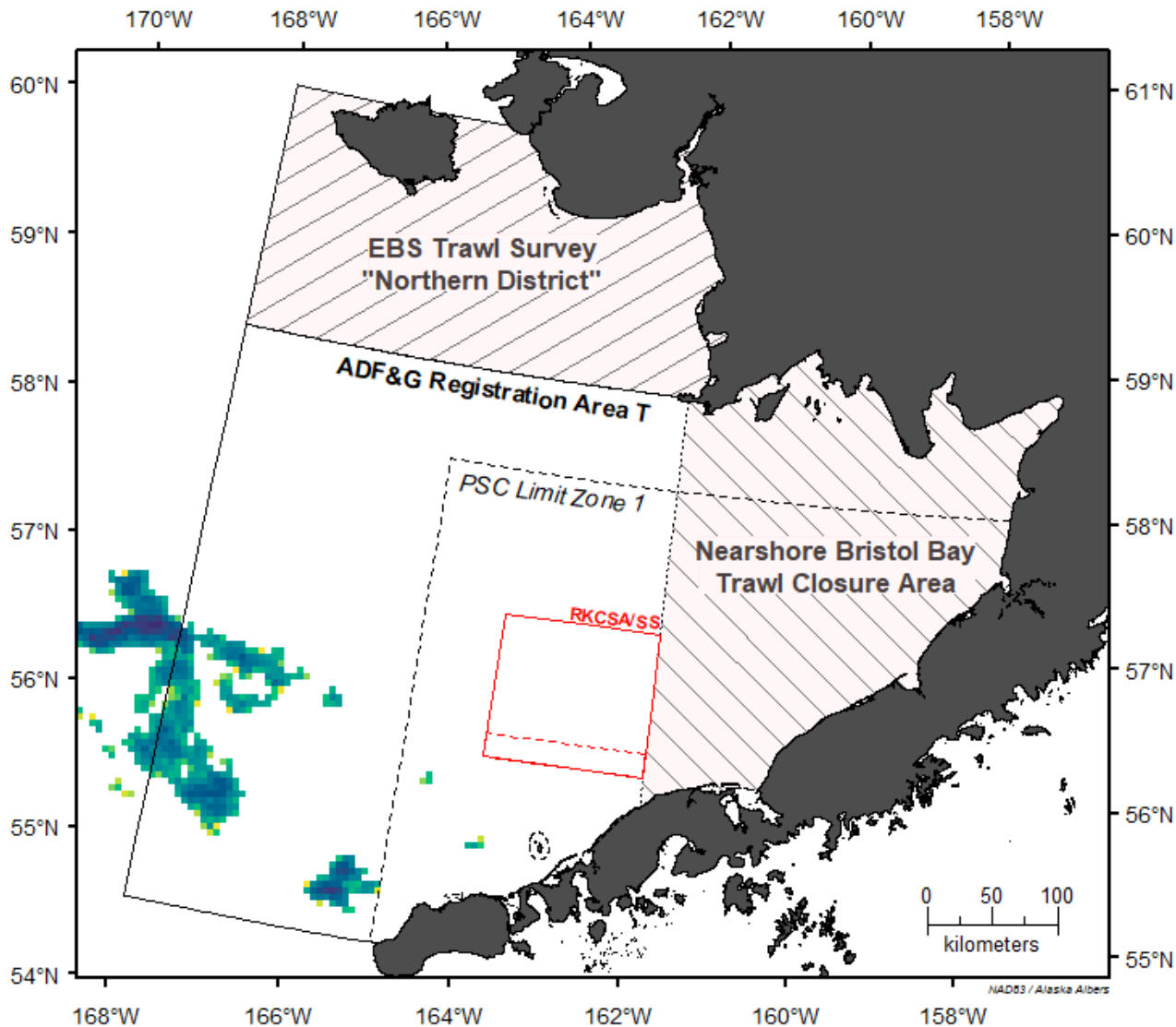
July 2006: Total Swept Area (SA), by PTR (6,399.7 km²)



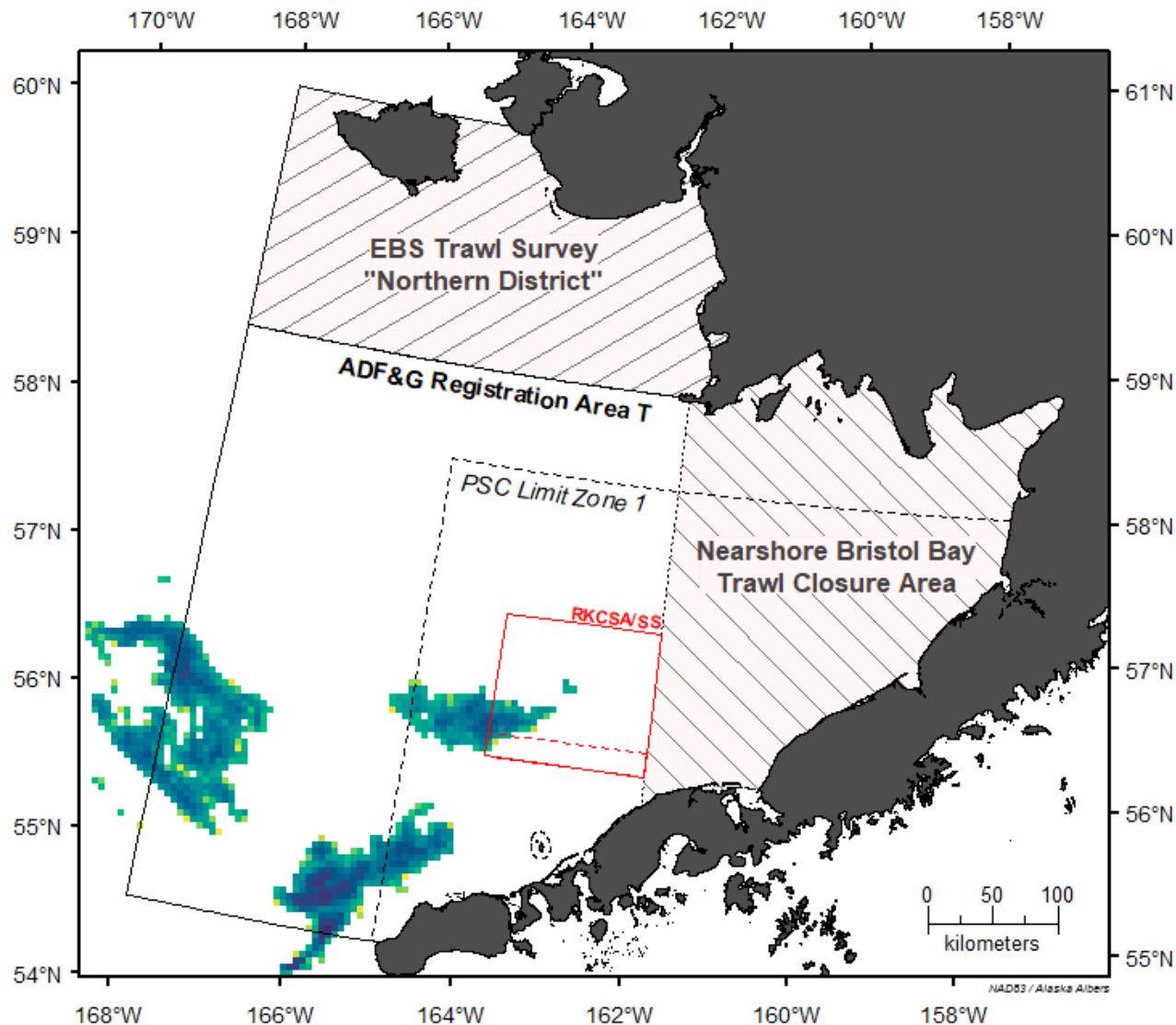
SA, km²



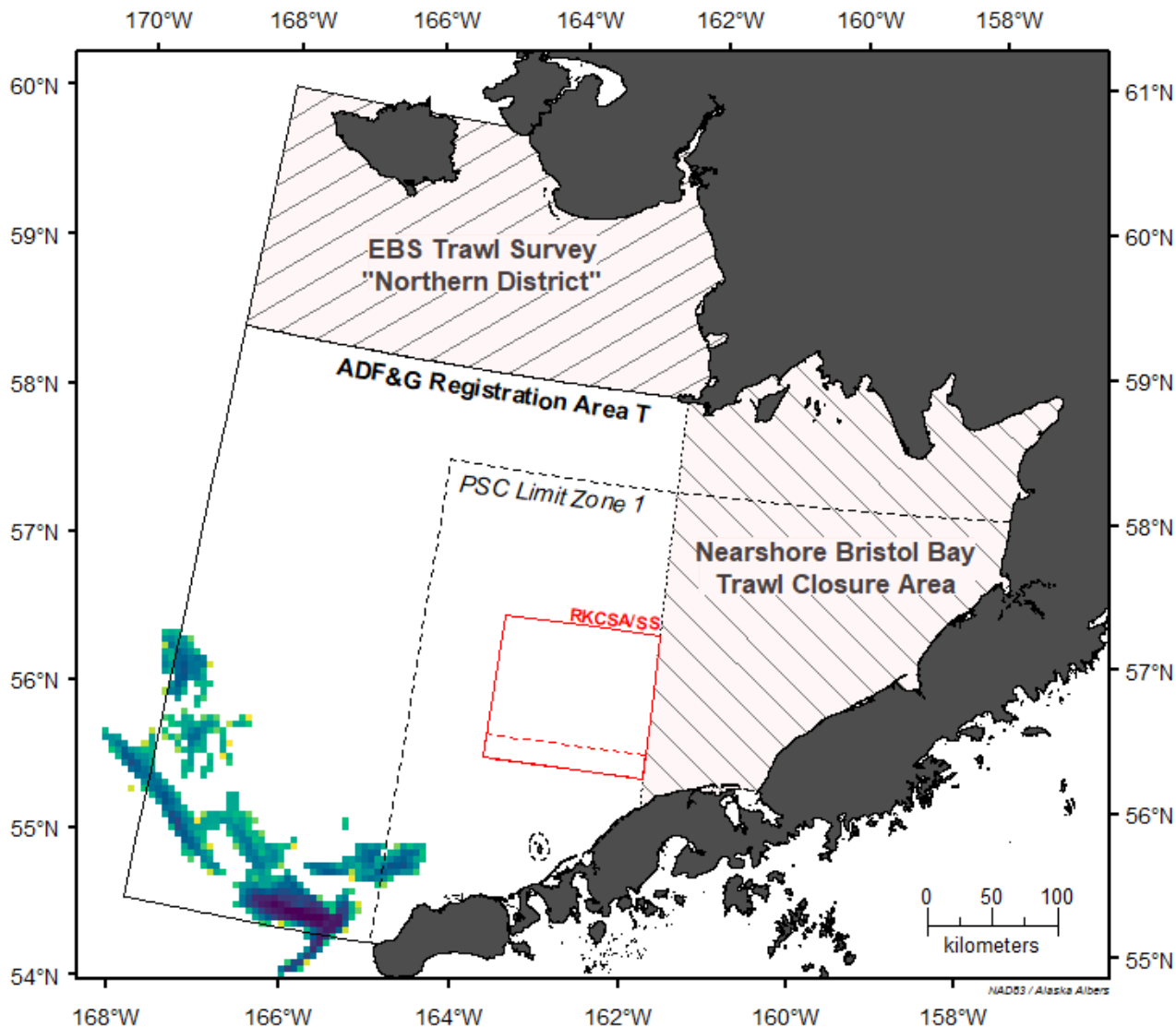
August 2006: Total Swept Area (SA), by PTR (953.8 km²)



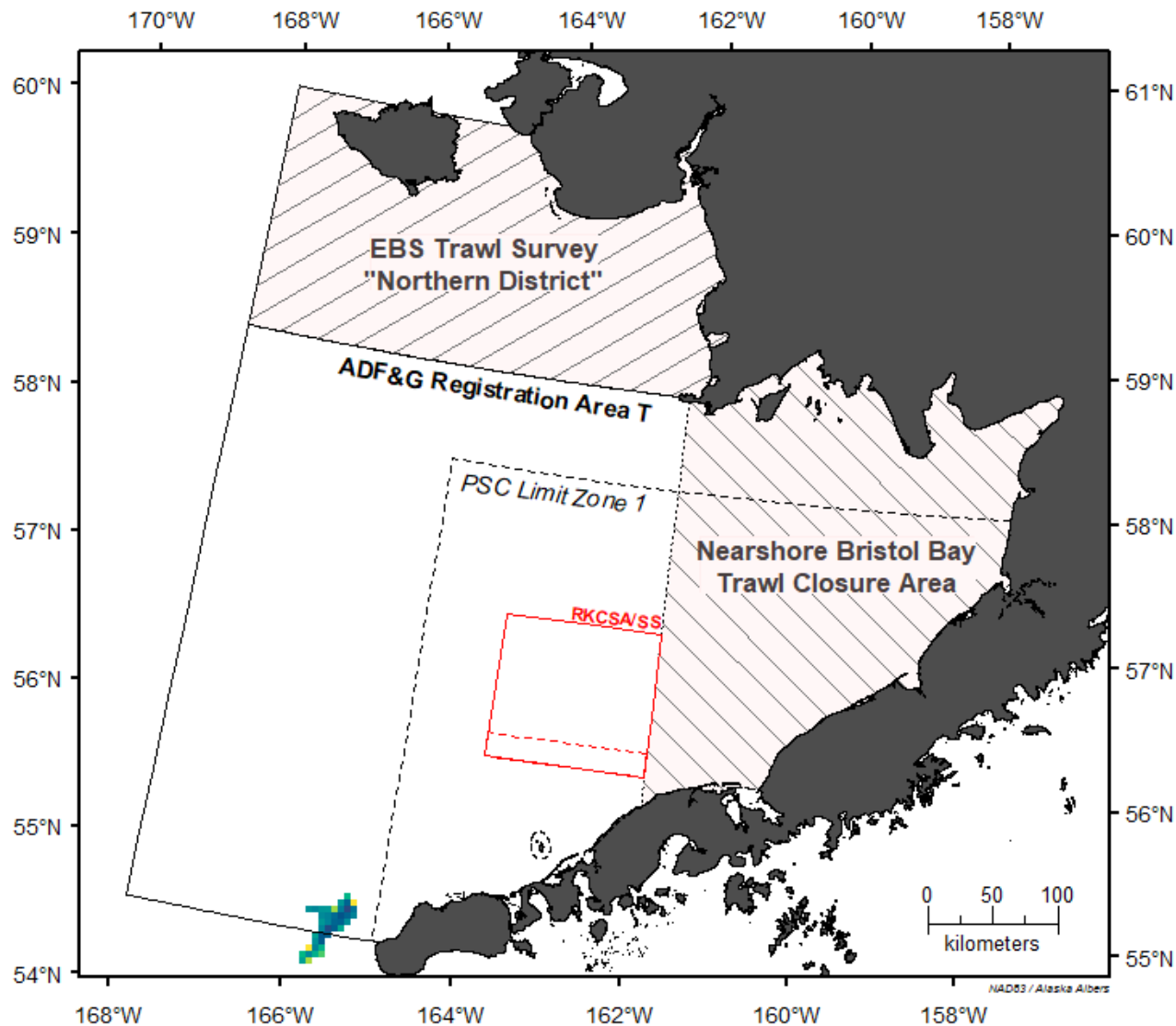
September 2006: Total Swept Area (SA), by PTR (3,701.6 km²)



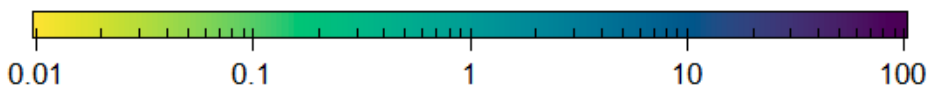
October 2006: Total Swept Area (SA), by PTR (3,957.6 km²)



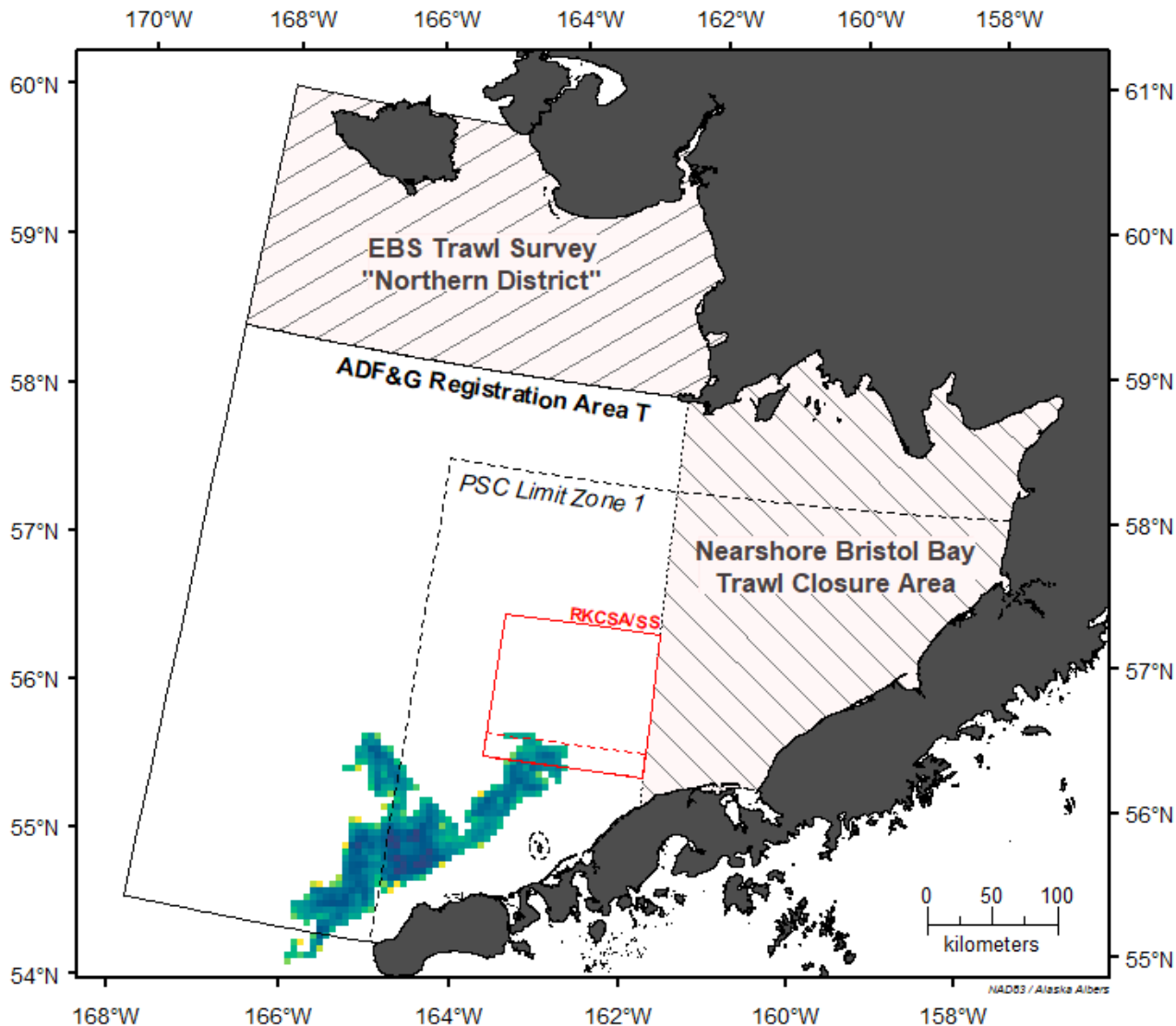
November 2006: Total Swept Area (SA), by PTR (132.3 km²)



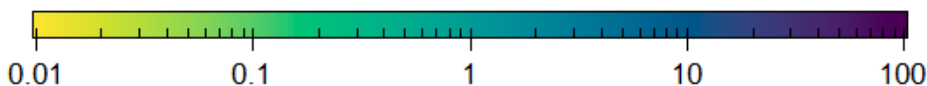
SA, km²



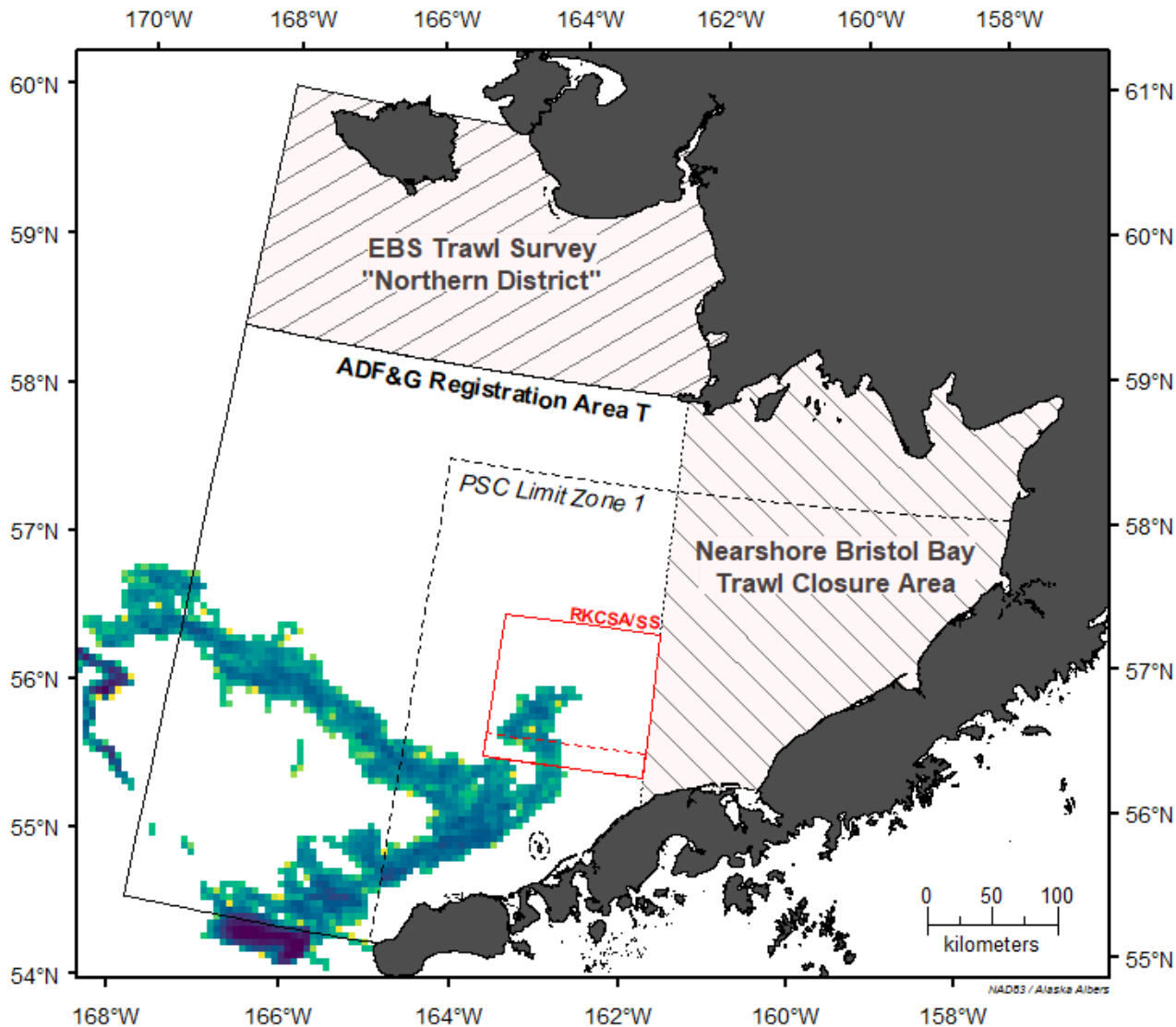
January 2007: Total Swept Area (SA), by PTR (2,902.9 km²)



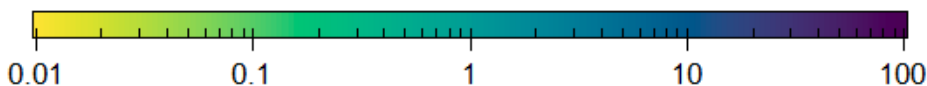
SA, km²



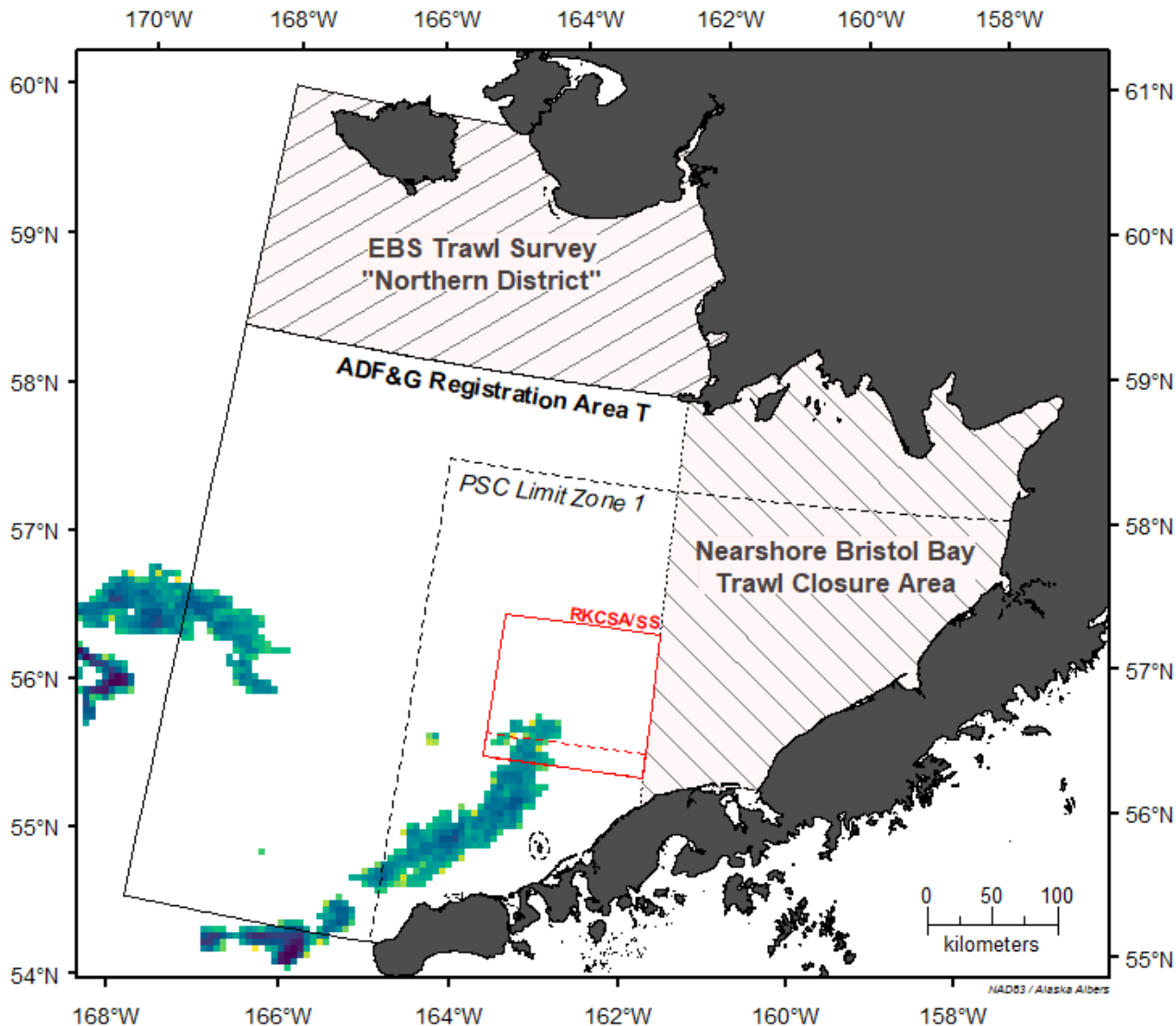
February 2007: Total Swept Area (SA), by PTR (4,703.4 km²)



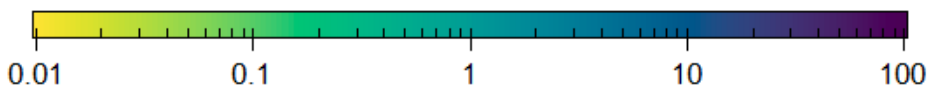
SA, km²



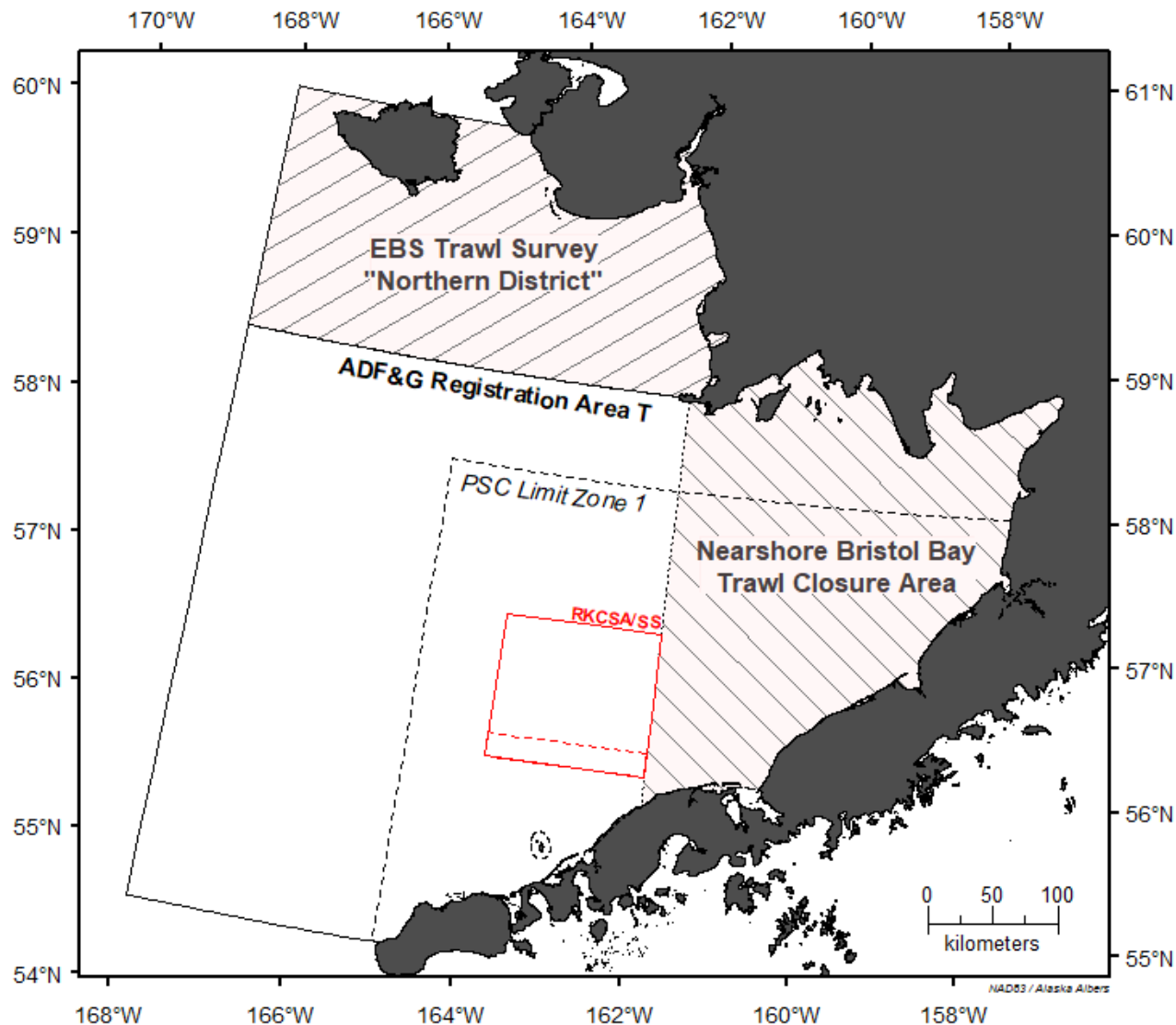
March 2007: Total Swept Area (SA), by PTR (1,537.6 km²)



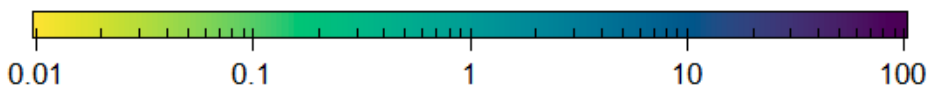
SA, km²



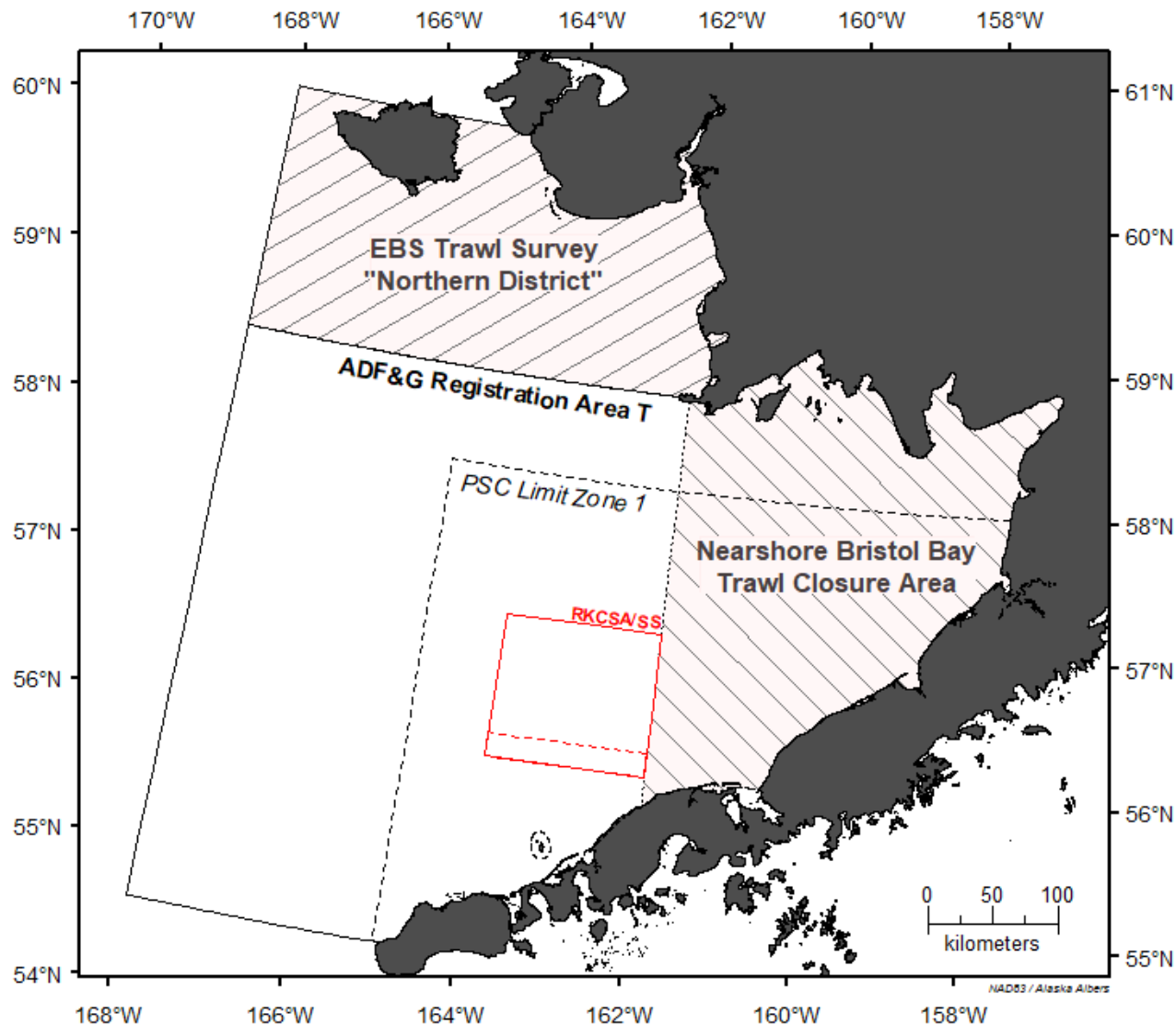
April 2007: Total Swept Area (SA), by PTR (0 km²)



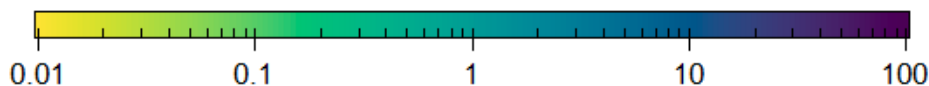
SA, km²



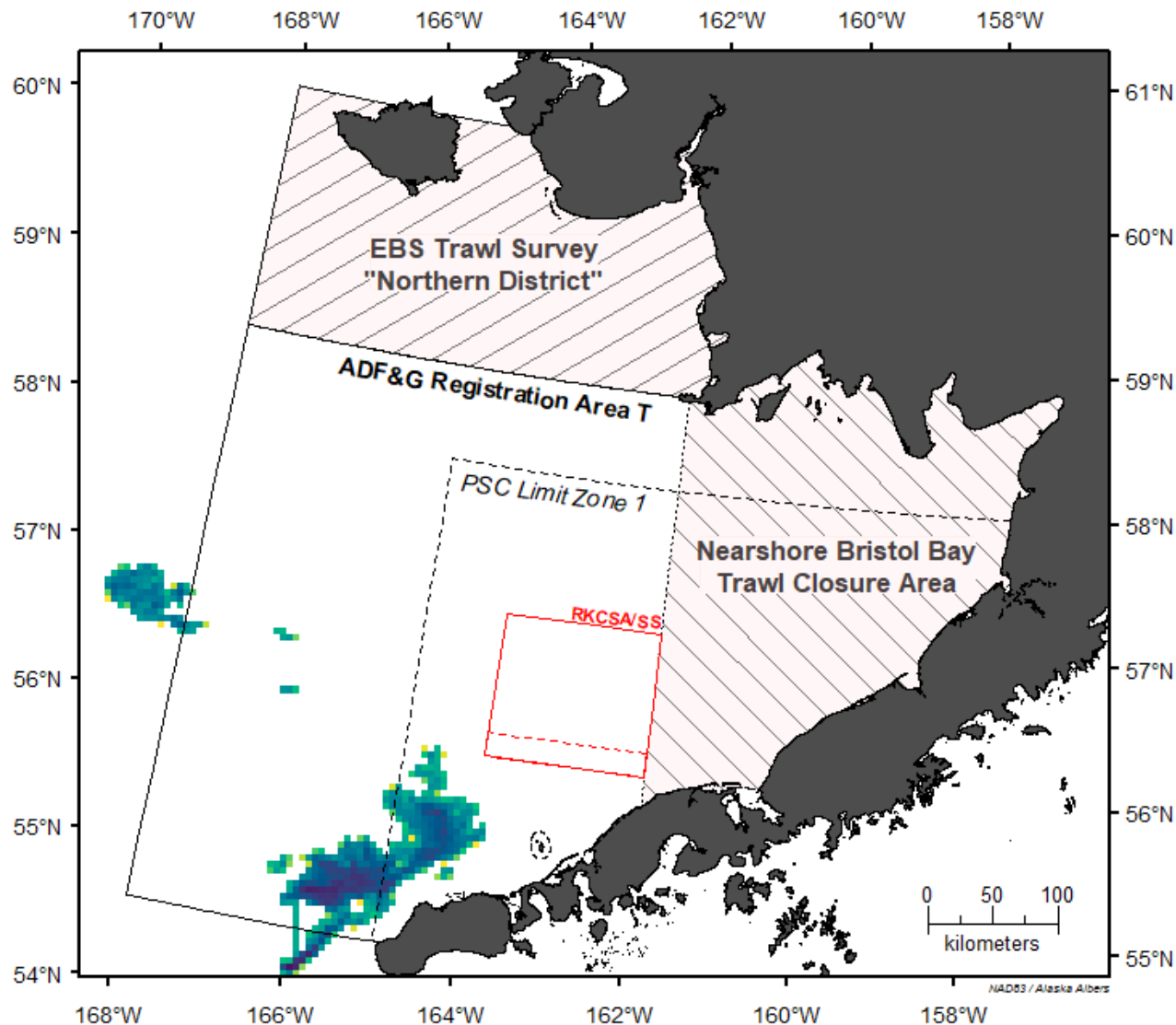
May 2007: Total Swept Area (SA), by PTR (0 km²)



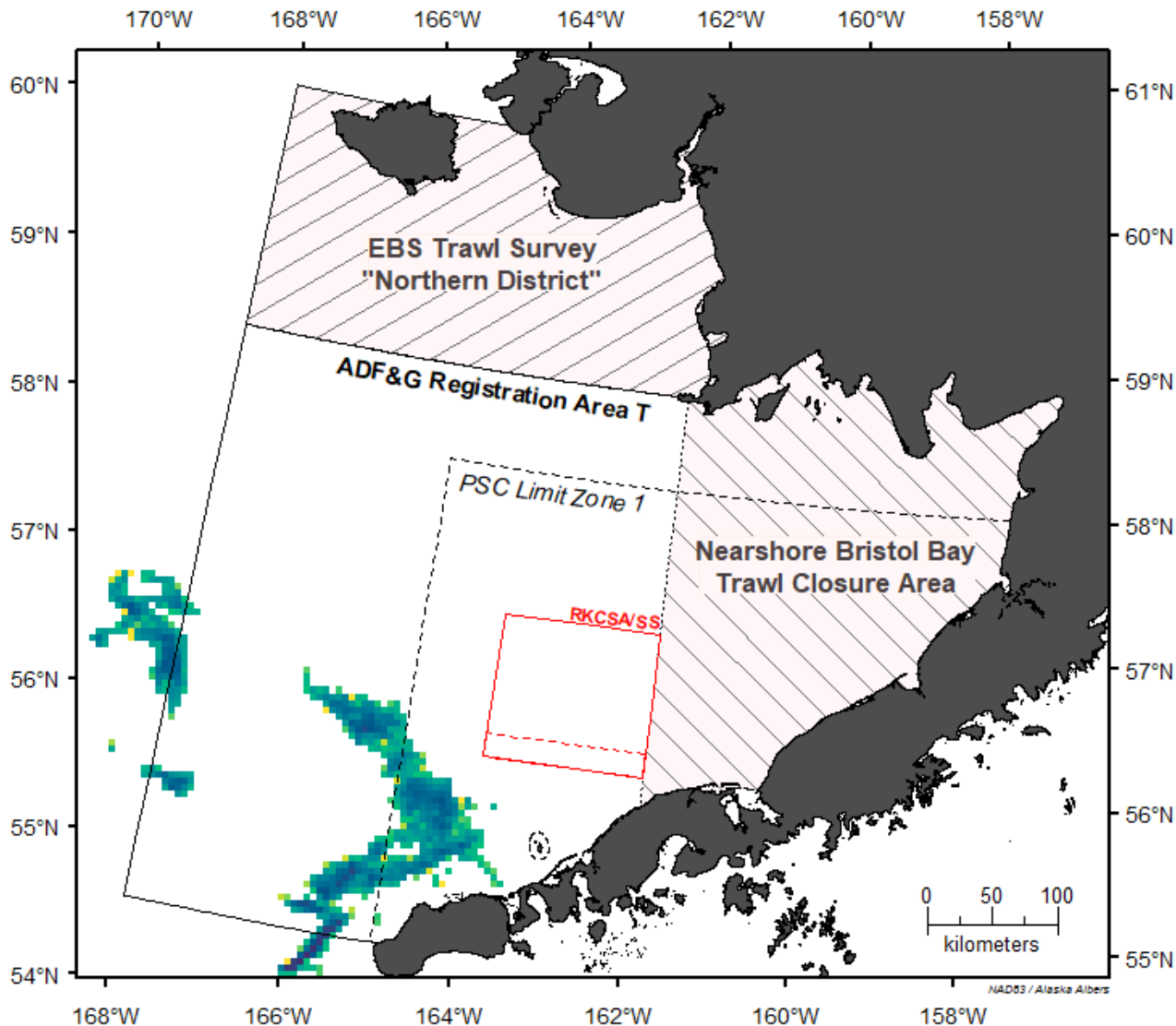
SA, km²



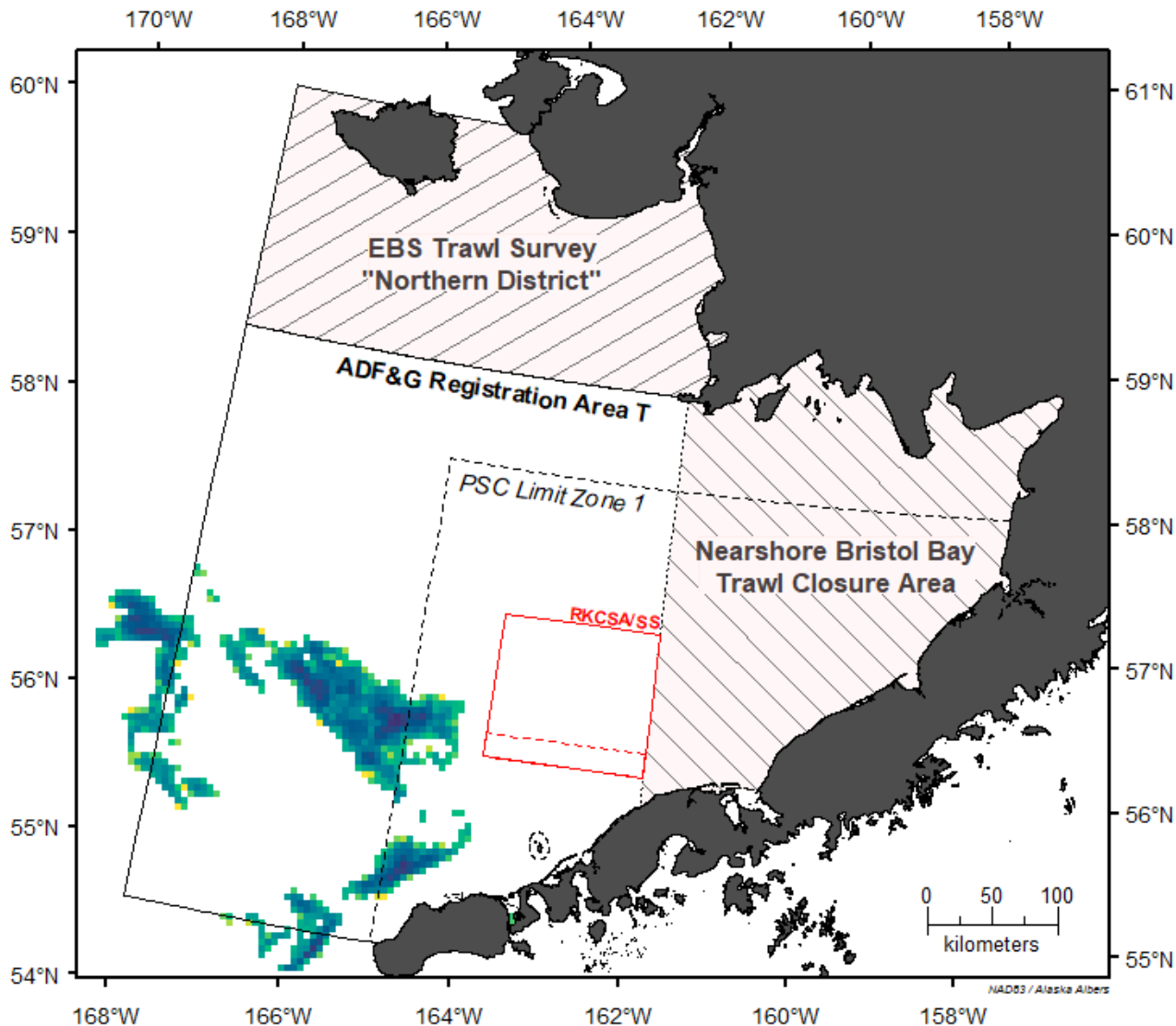
June 2007: Total Swept Area (SA), by PTR (3,387.2 km²)



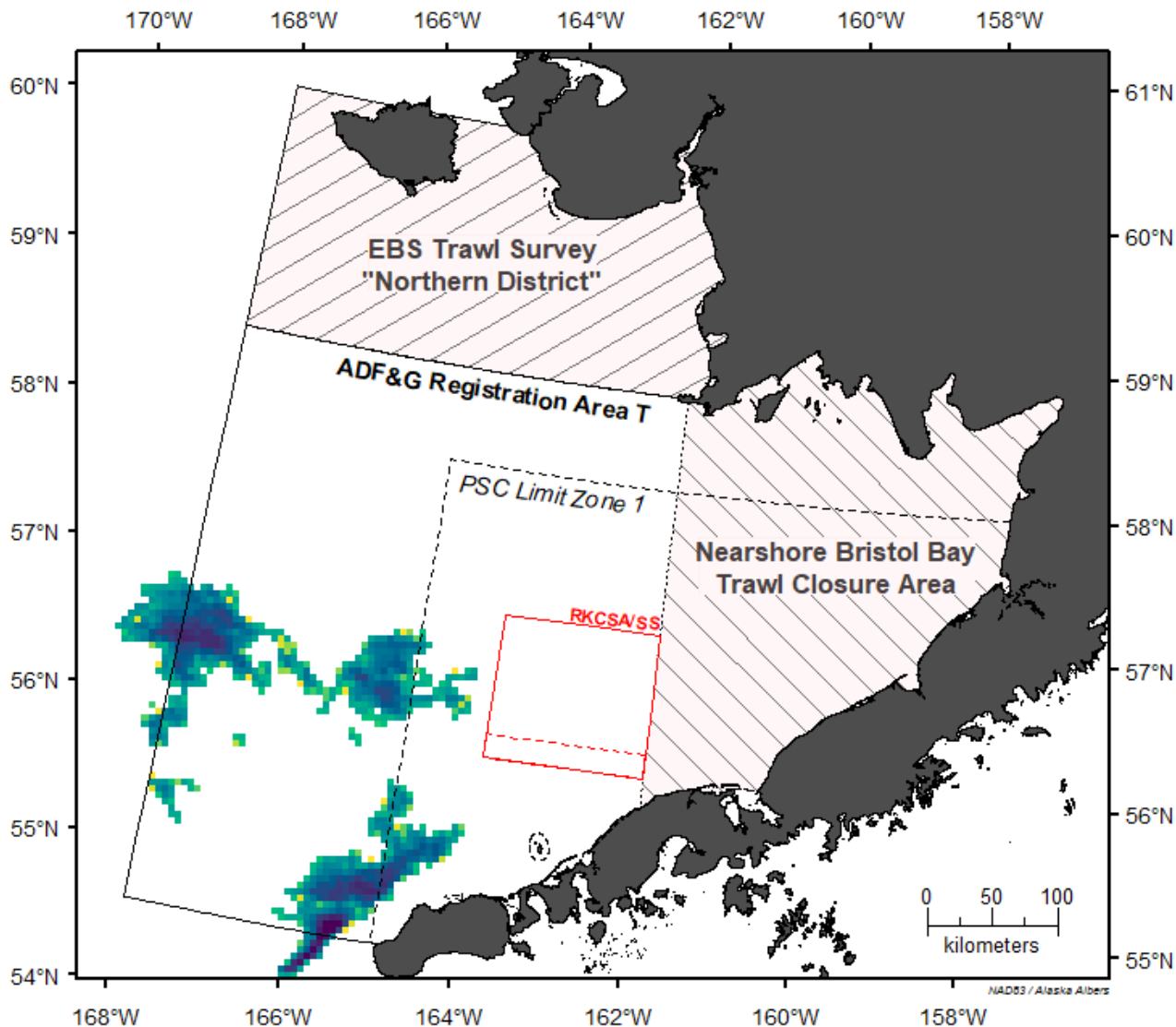
July 2007: Total Swept Area (SA), by PTR (1,752.2 km²)



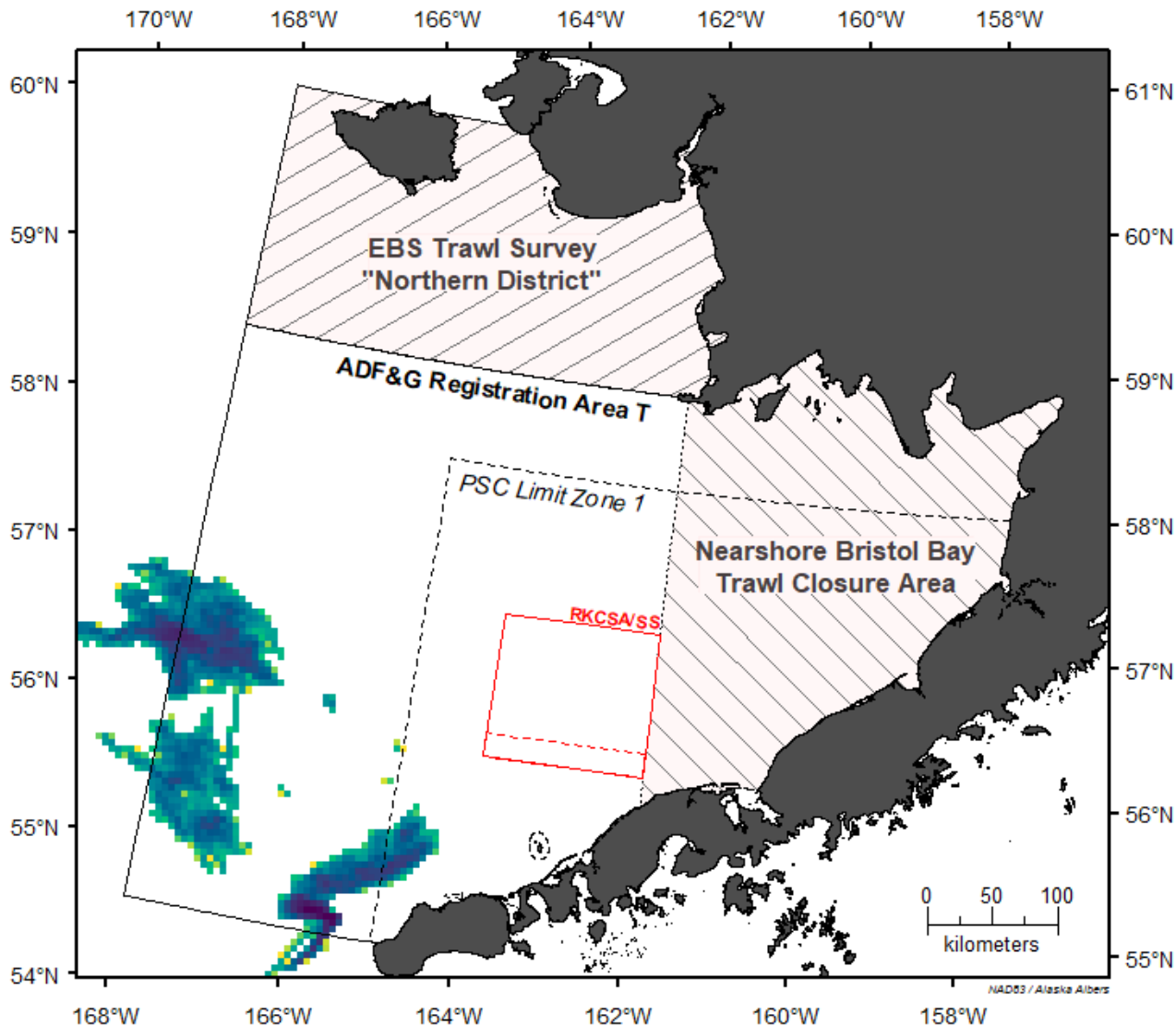
August 2007: Total Swept Area (SA), by PTR (2,665.3 km²)



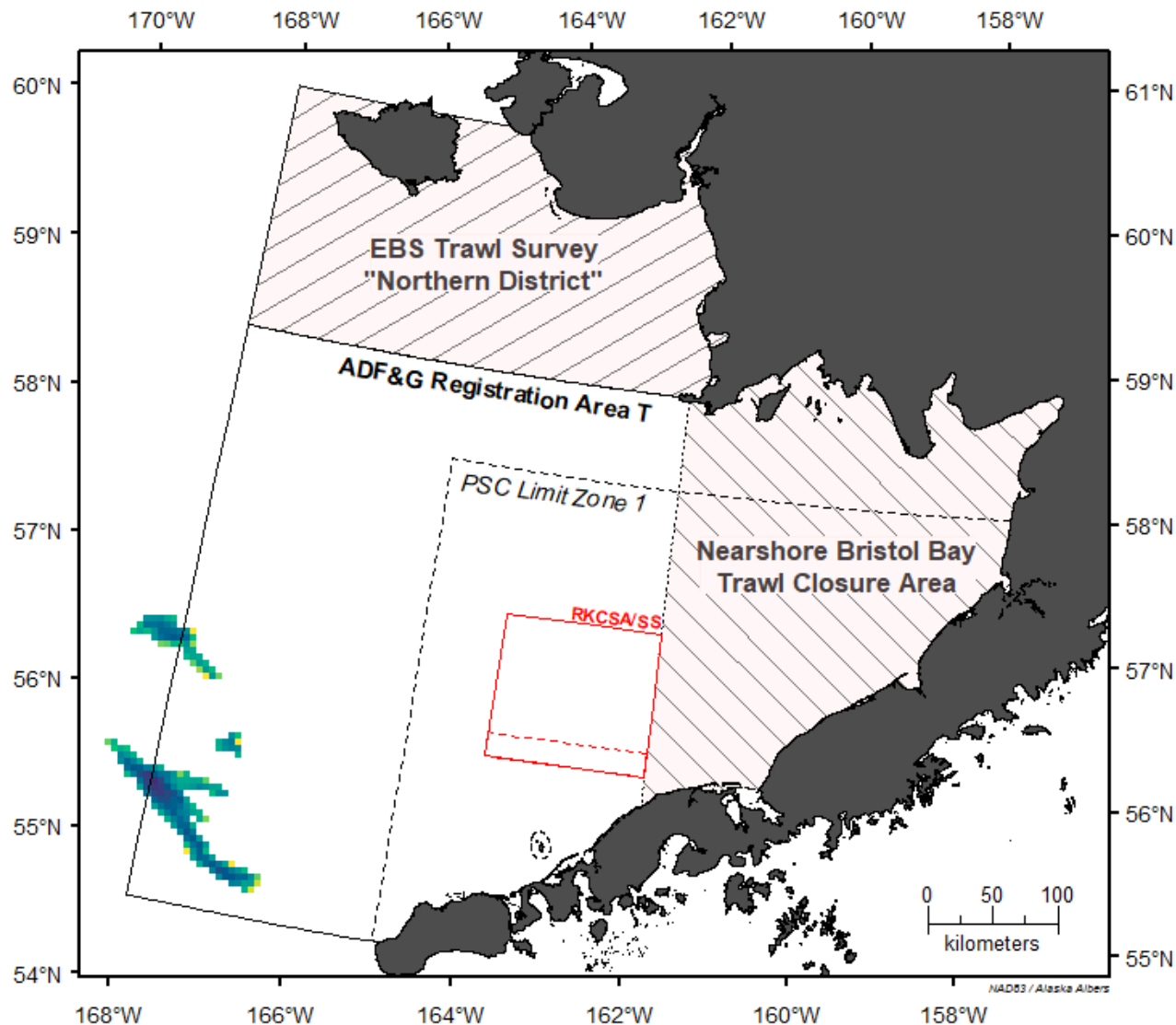
September 2007: Total Swept Area (SA), by PTR (5,331.7 km²)



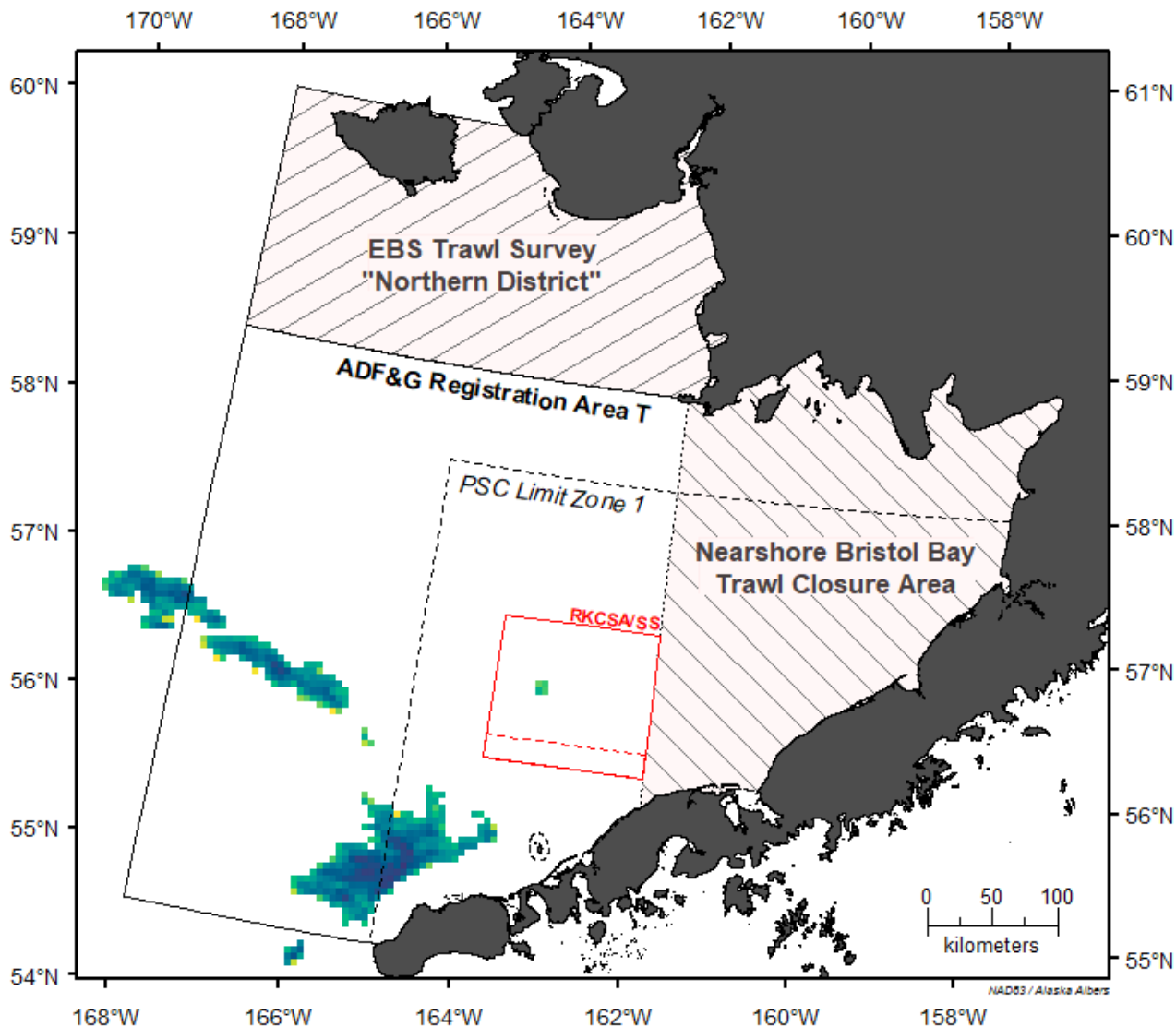
October 2007: Total Swept Area (SA), by PTR (6,315.8 km²)



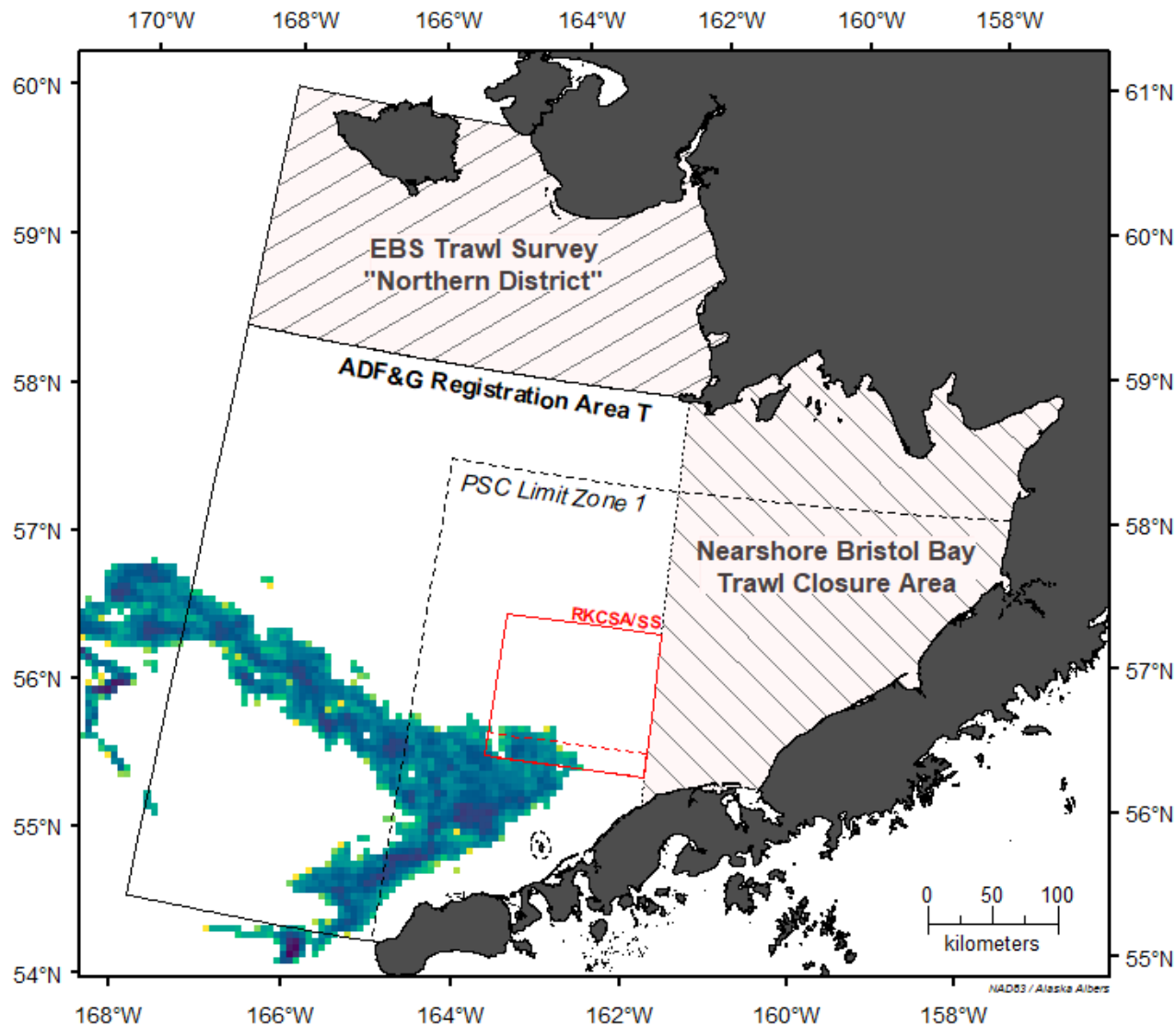
November 2007: Total Swept Area (SA), by PTR (619.9 km²)



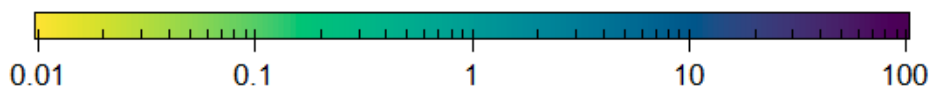
January 2008: Total Swept Area (SA), by PTR (2,288.8 km²)



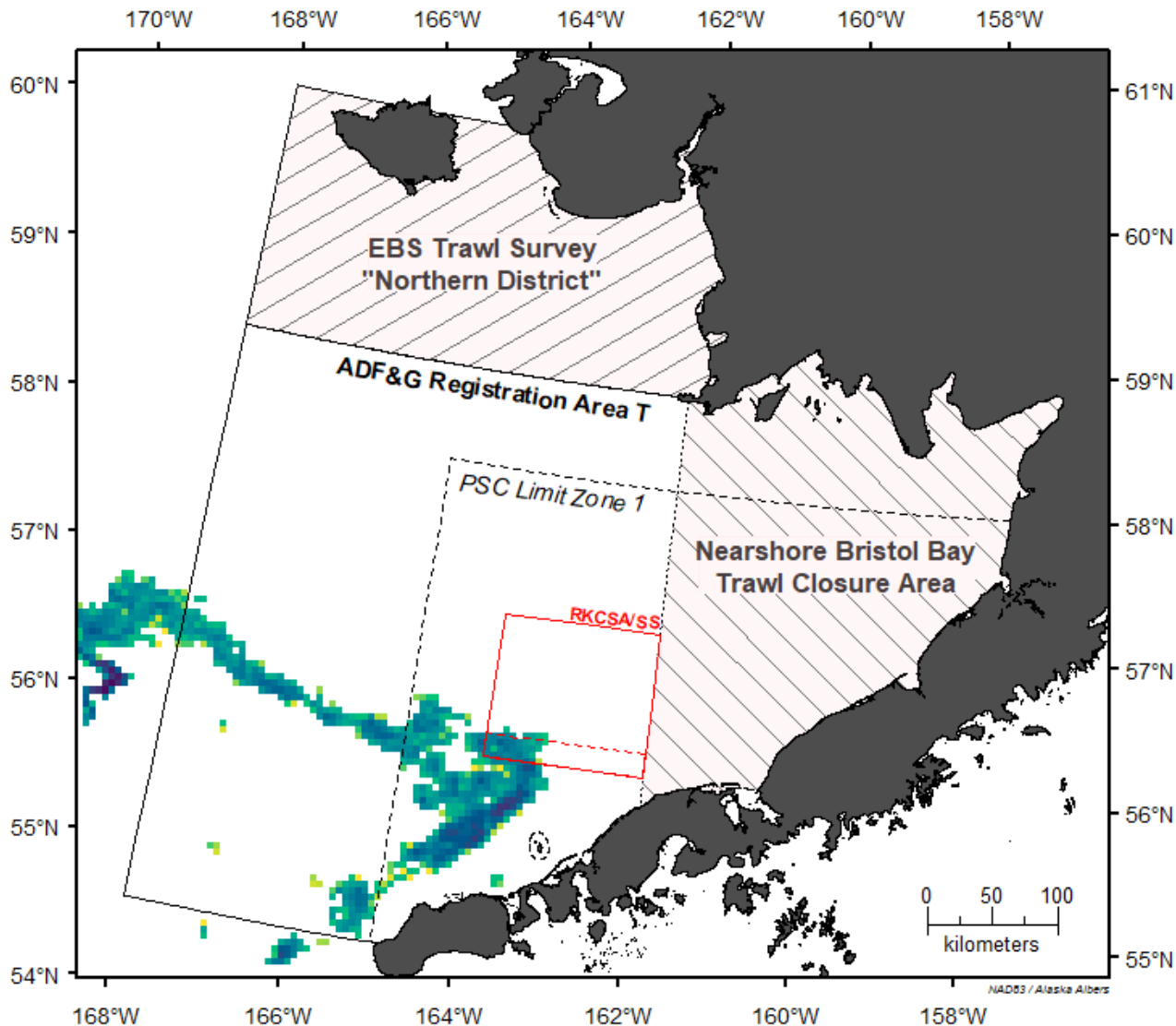
February 2008: Total Swept Area (SA), by PTR (8,001.8 km²)



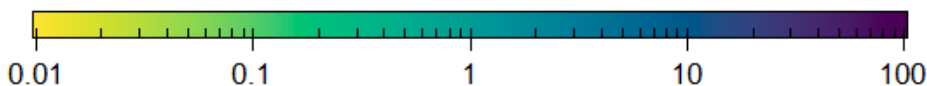
SA, km²



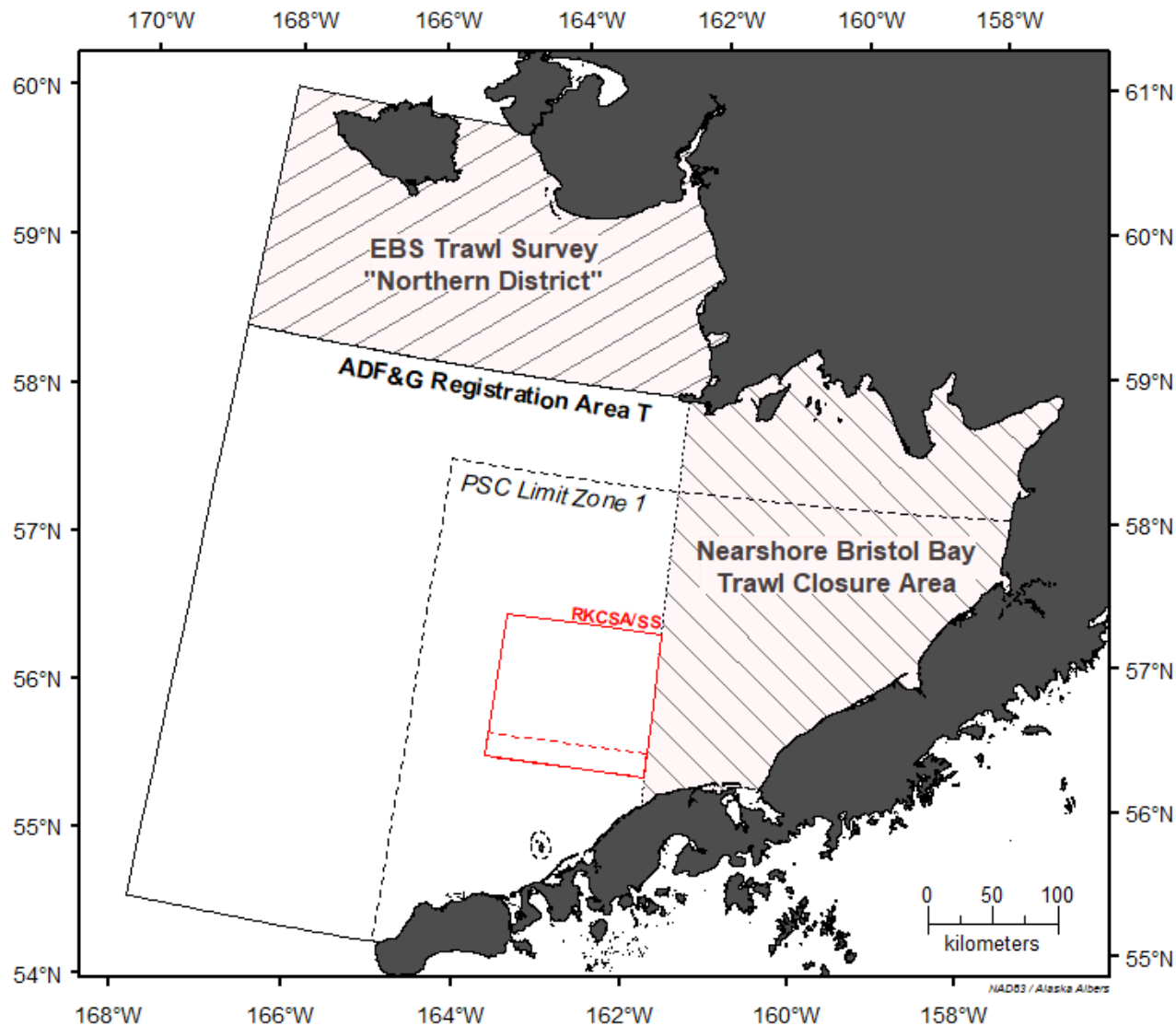
March 2008: Total Swept Area (SA), by PTR (2,854.7 km²)



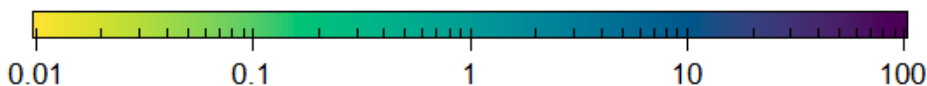
SA, km²



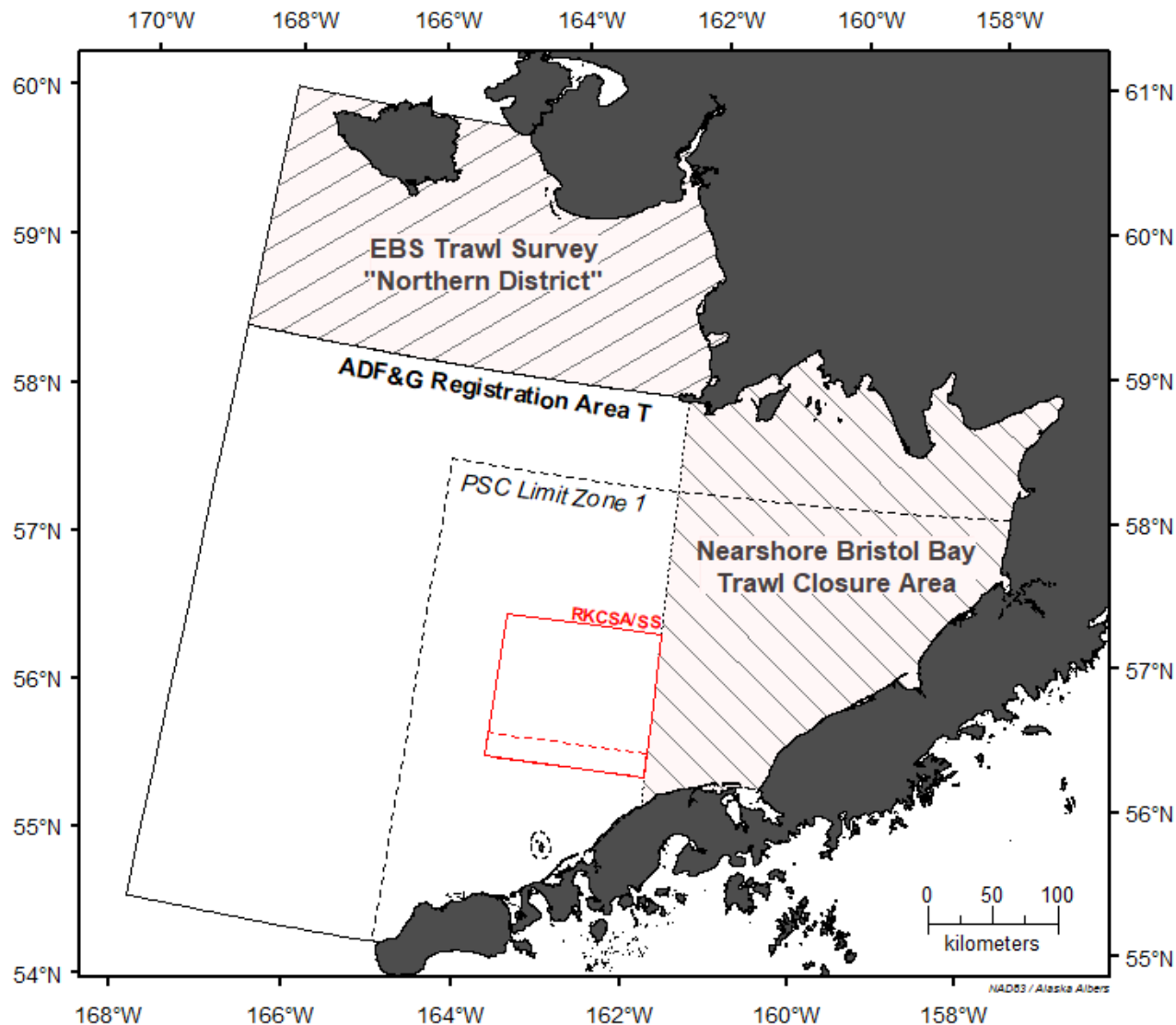
April 2008: Total Swept Area (SA), by PTR (0 km²)



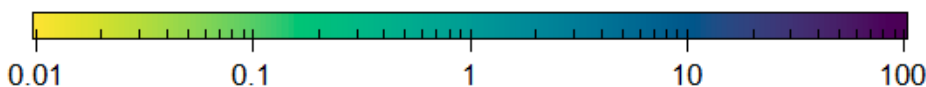
SA, km²



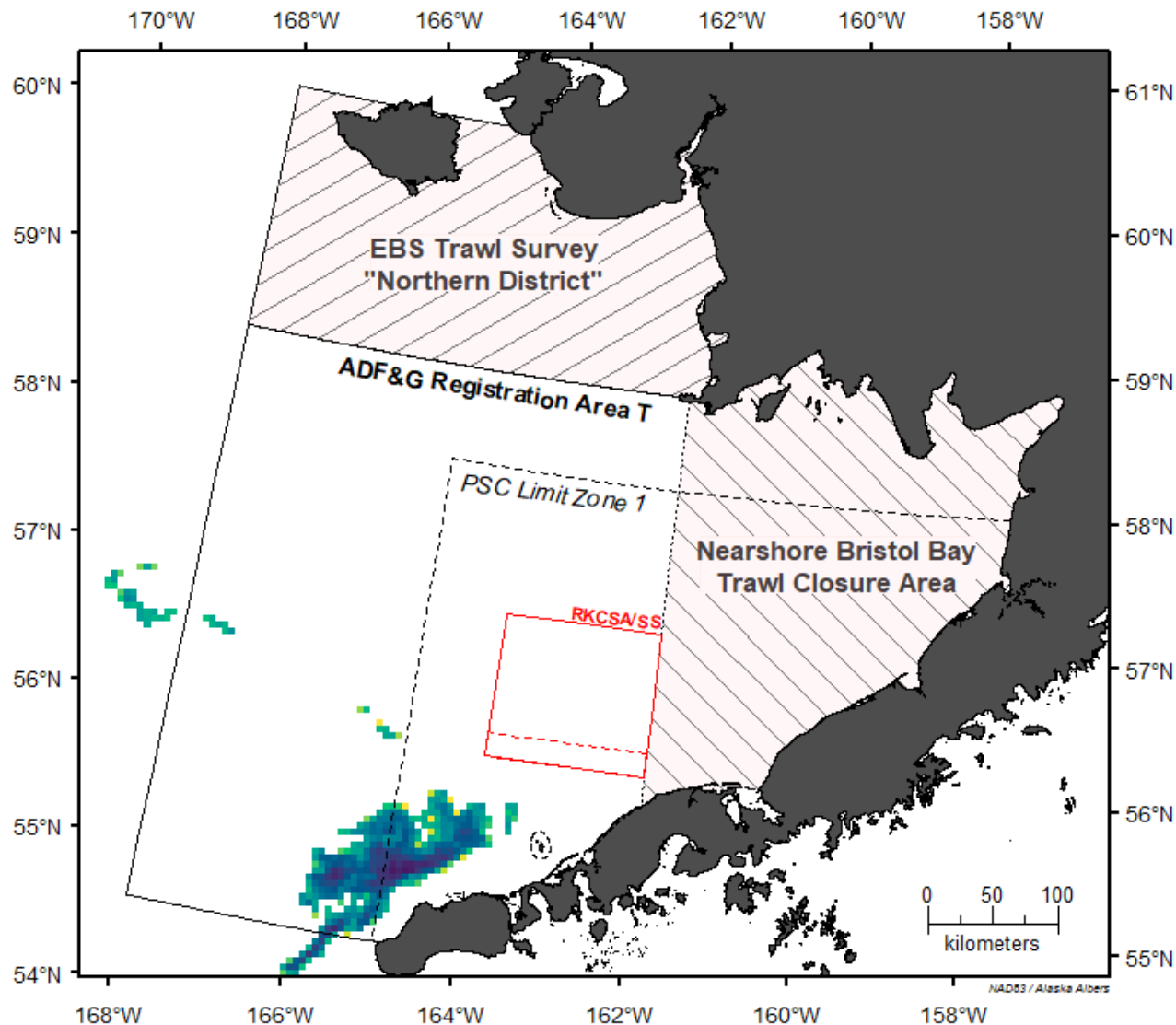
May 2008: Total Swept Area (SA), by PTR (0 km²)



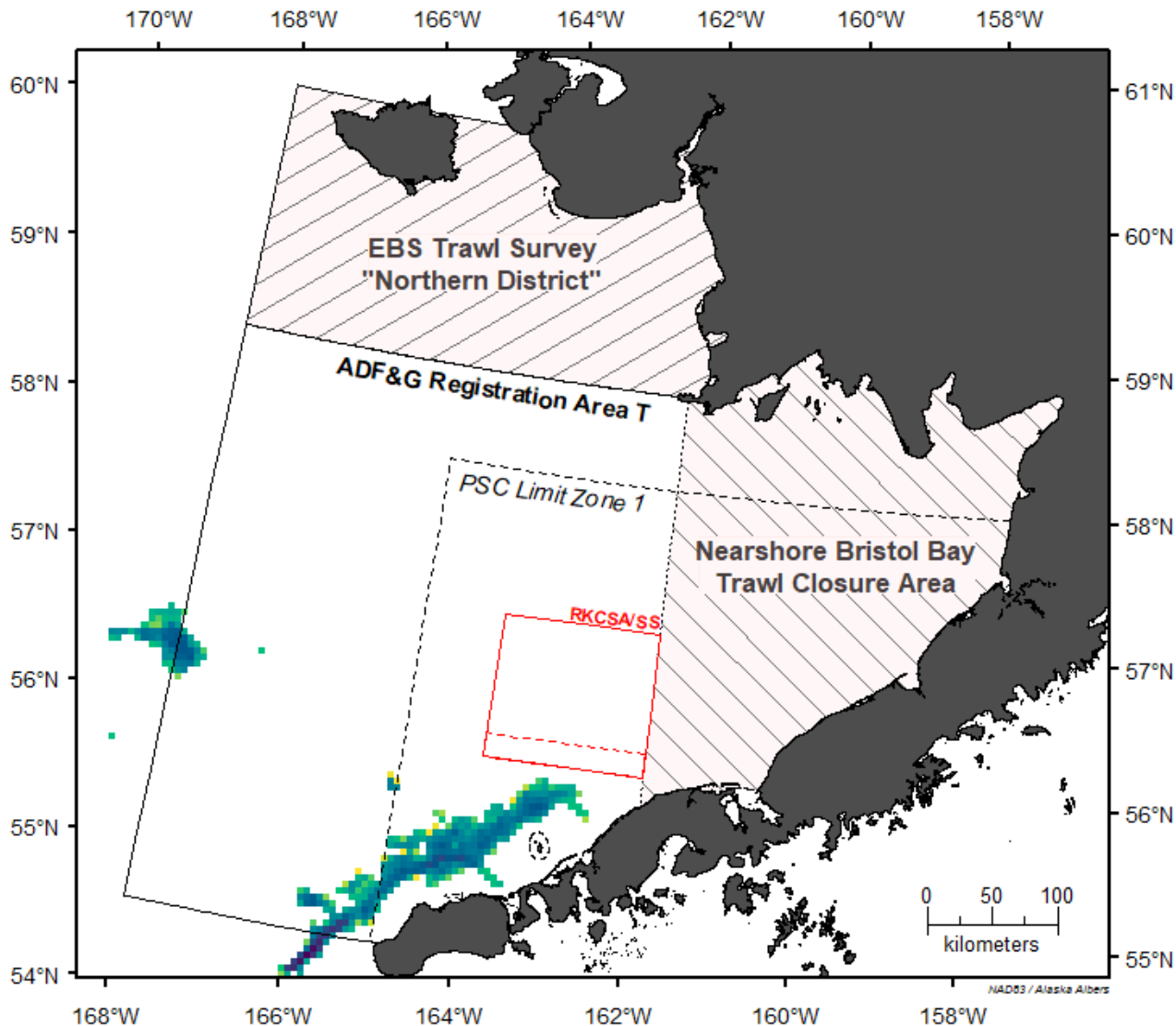
SA, km²



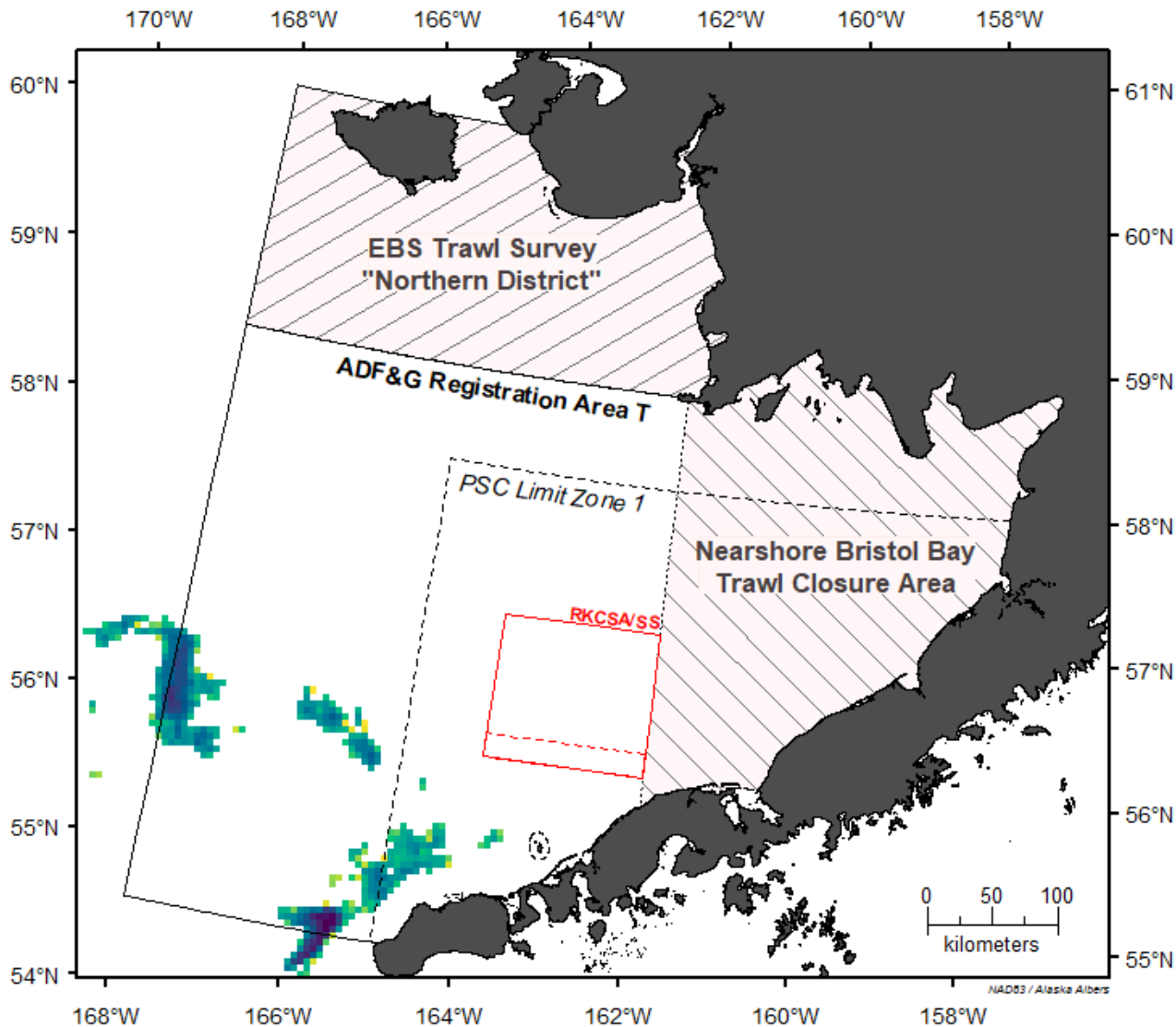
June 2008: Total Swept Area (SA), by PTR (4,383.1 km²)



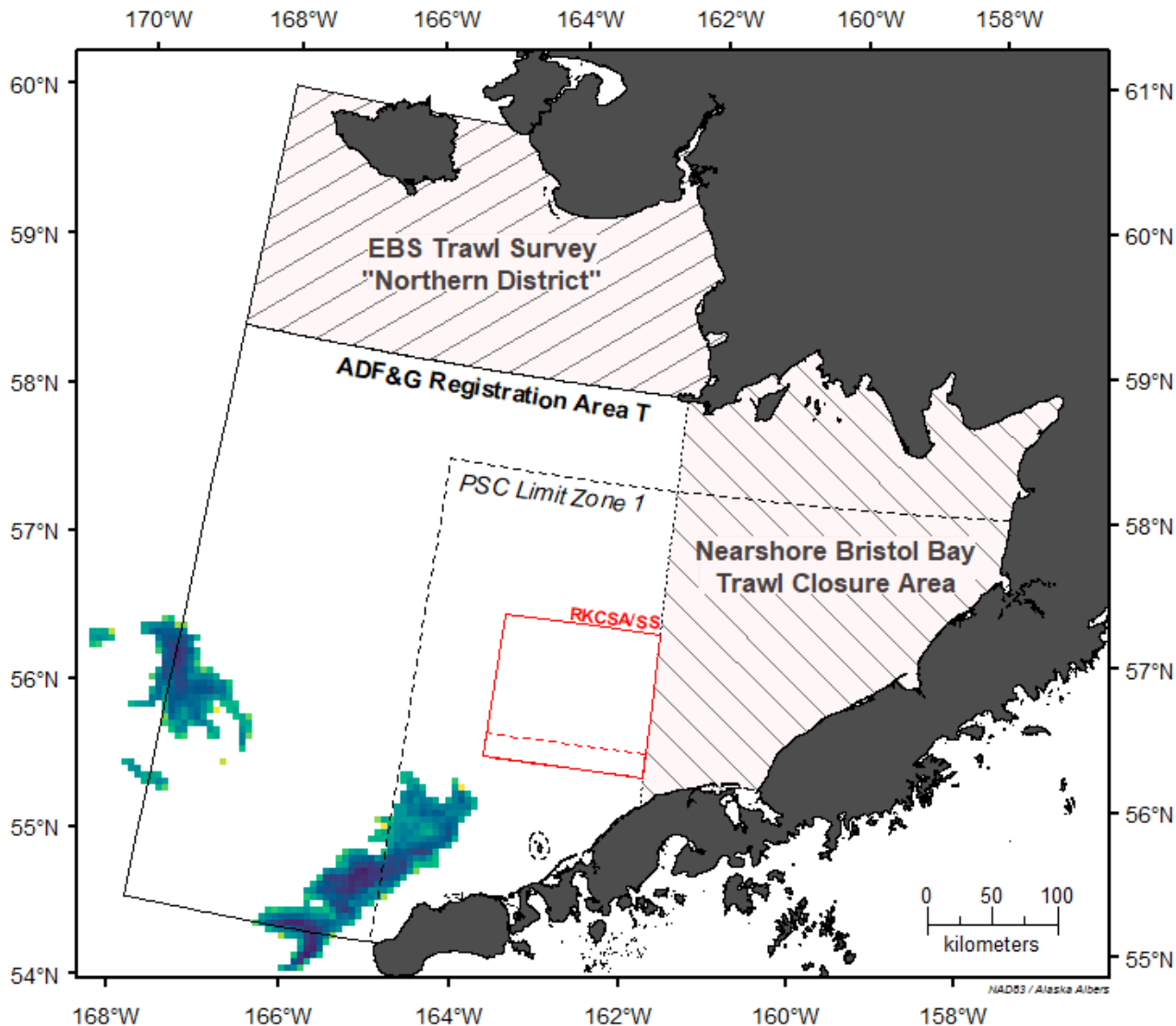
July 2008: Total Swept Area (SA), by PTR (1,722.3 km²)



August 2008: Total Swept Area (SA), by PTR (1,907.4 km²)

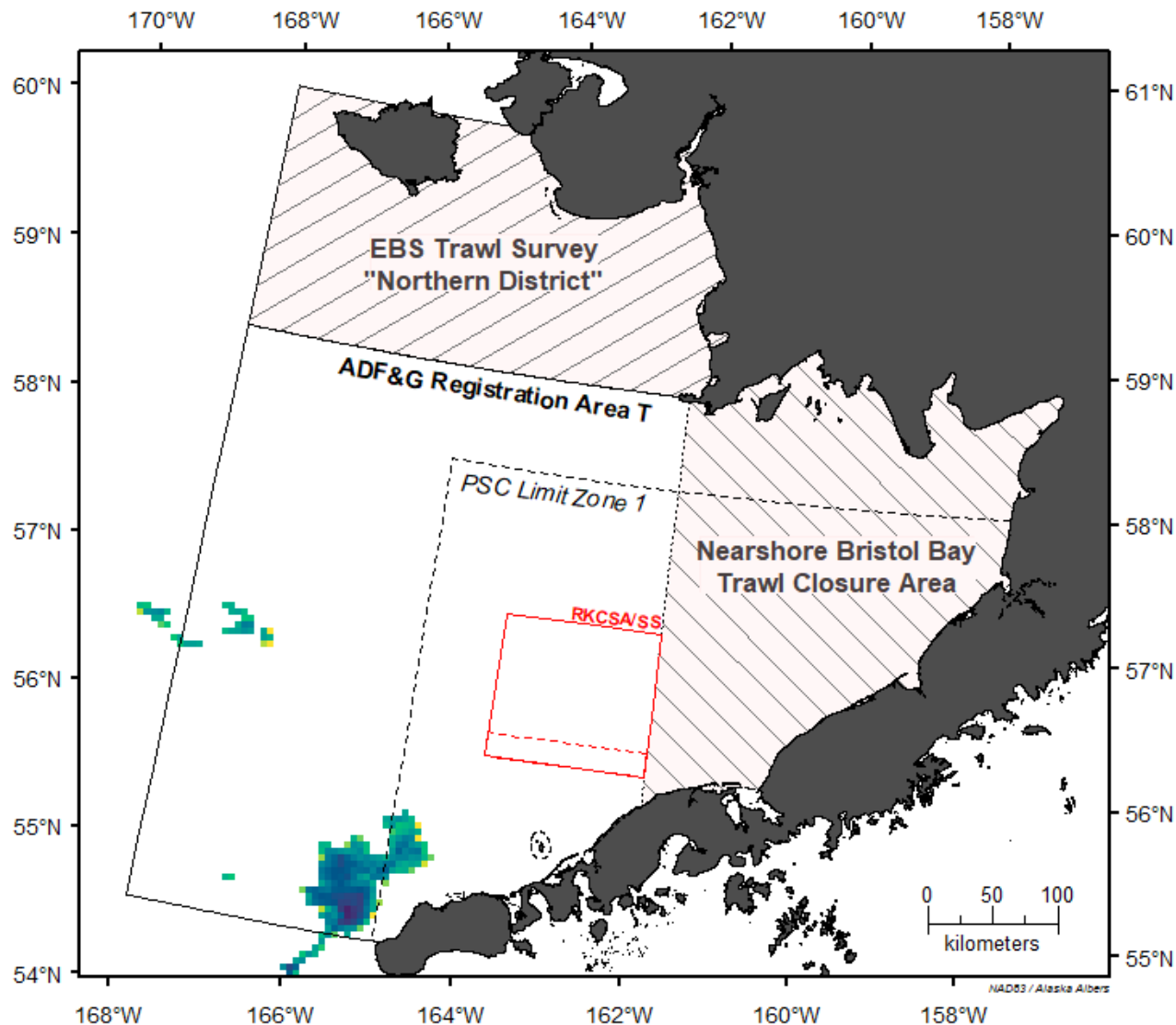


September 2008: Total Swept Area (SA), by PTR (3,723.5 km²)

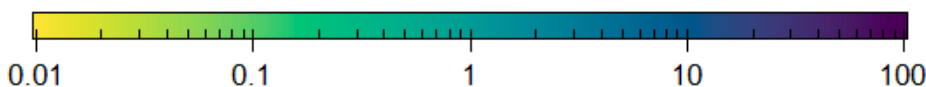


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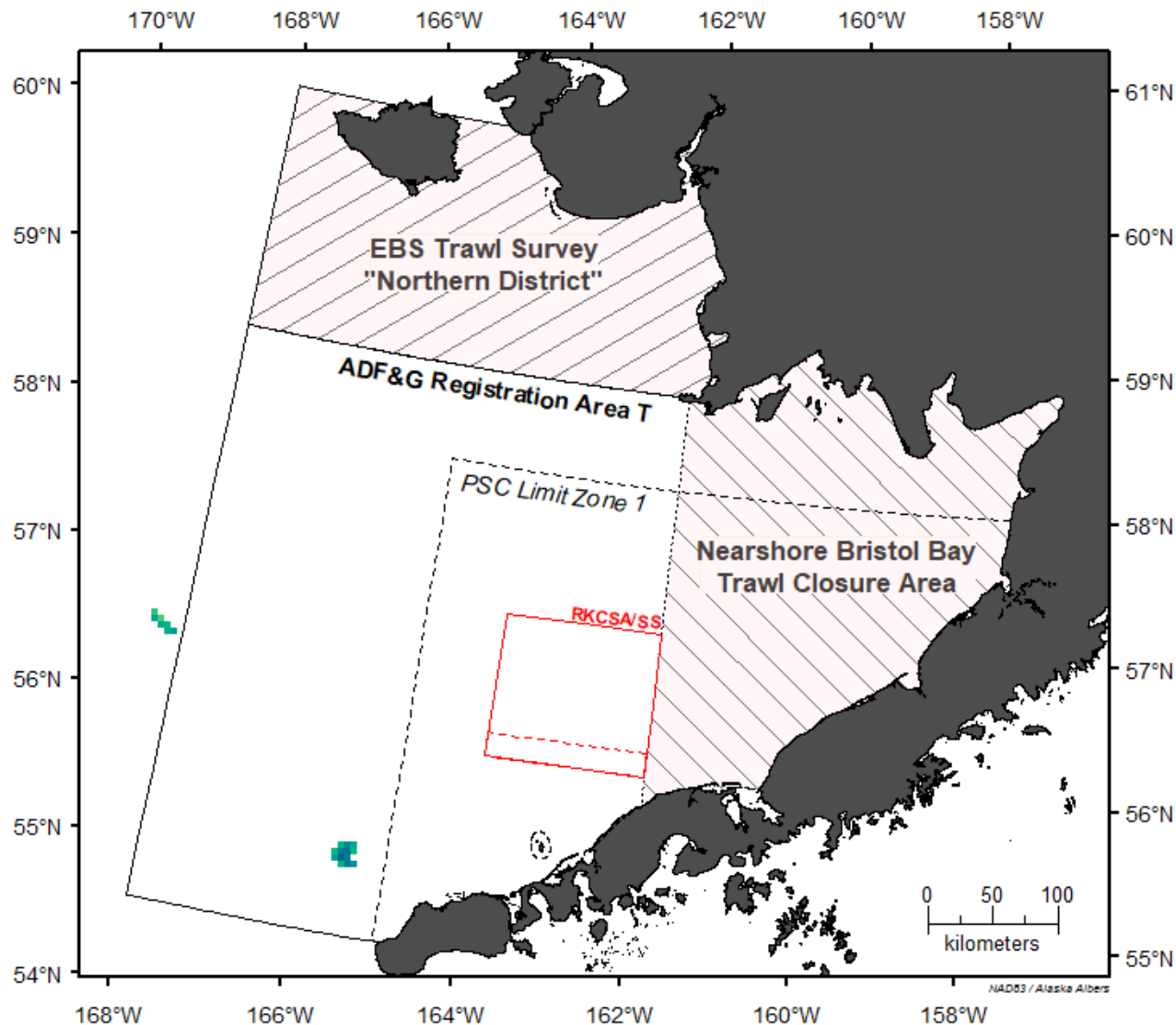
October 2008: Total Swept Area (SA), by PTR (1,089.4 km²)



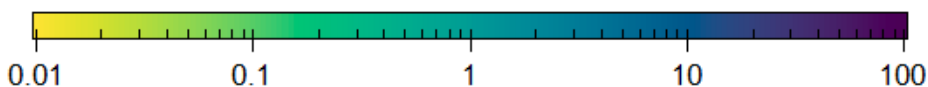
SA, km²



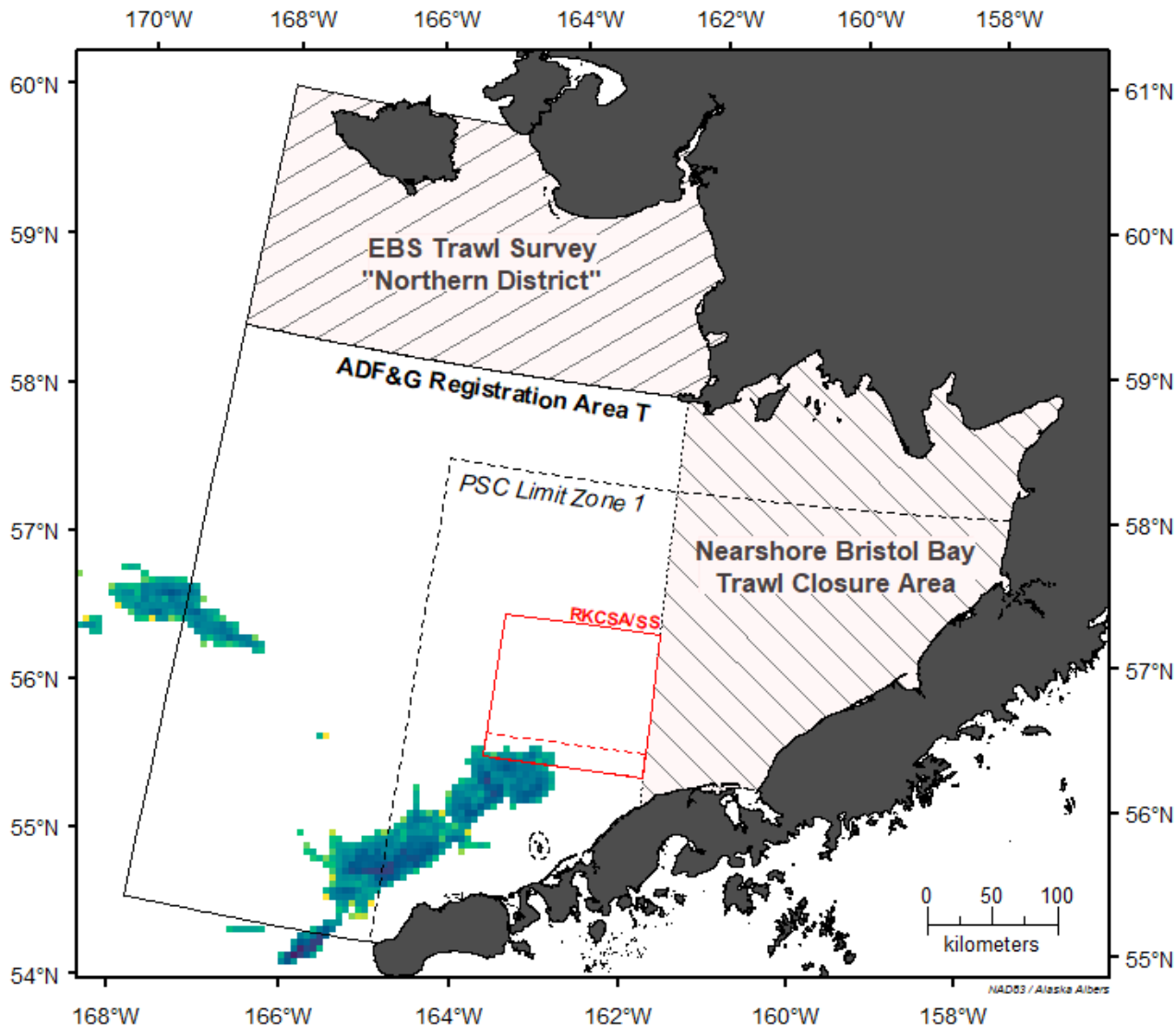
November 2008: Total Swept Area (SA), by PTR (25.2 km²)



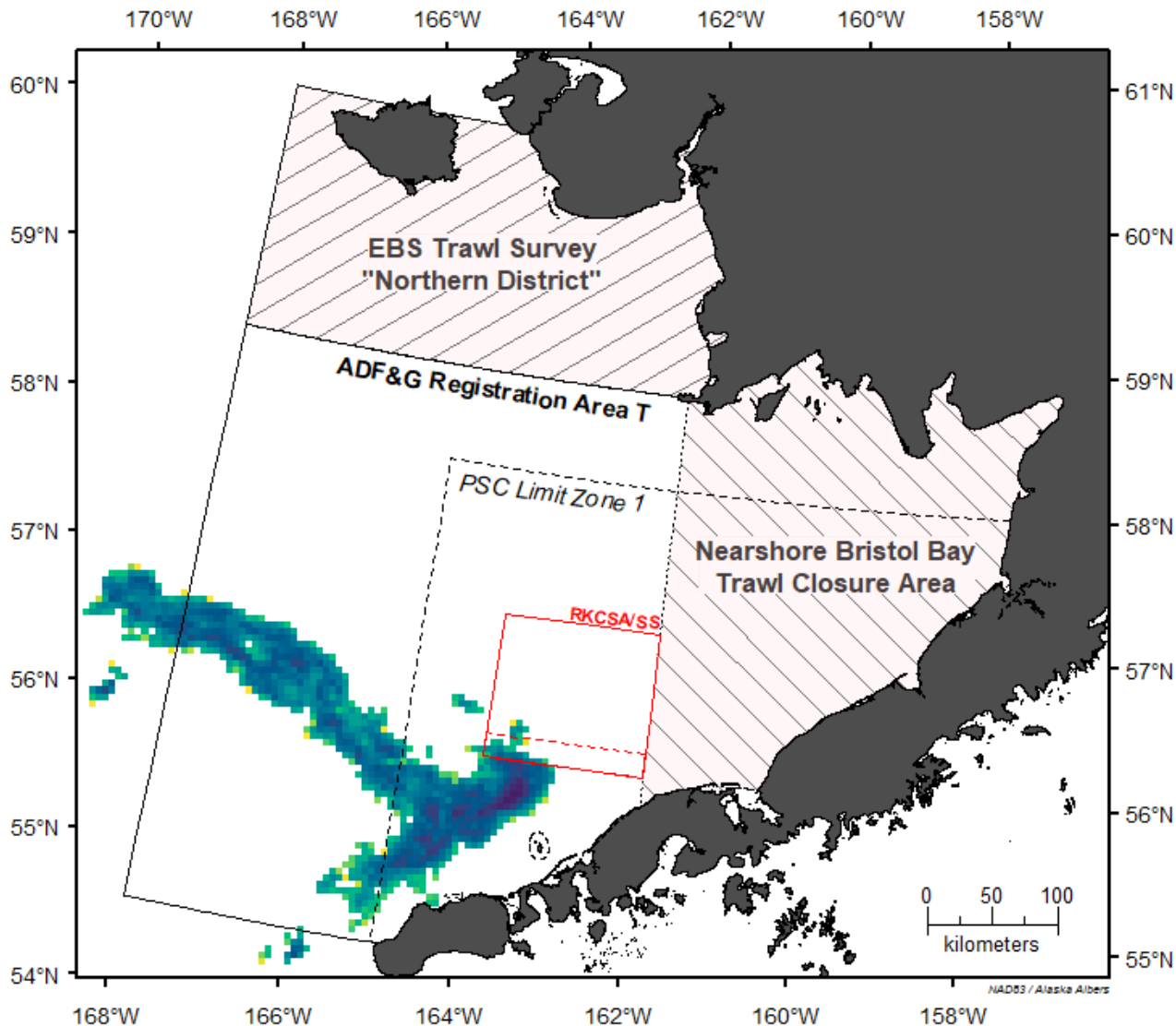
SA, km²



January 2009: Total Swept Area (SA), by PTR (2,440.6 km²)

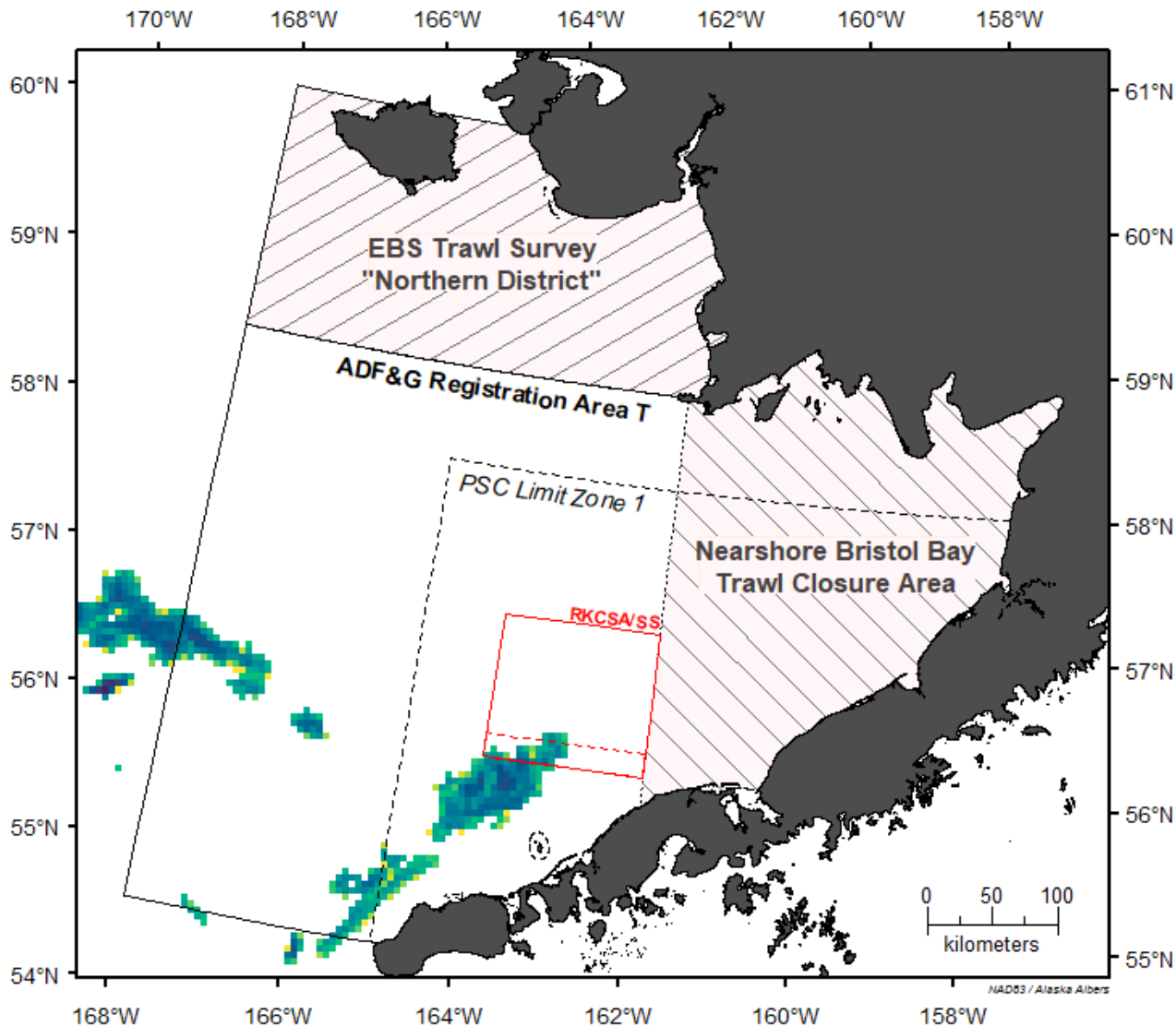


February 2009: Total Swept Area (SA), by PTR (8,053.1 km²)

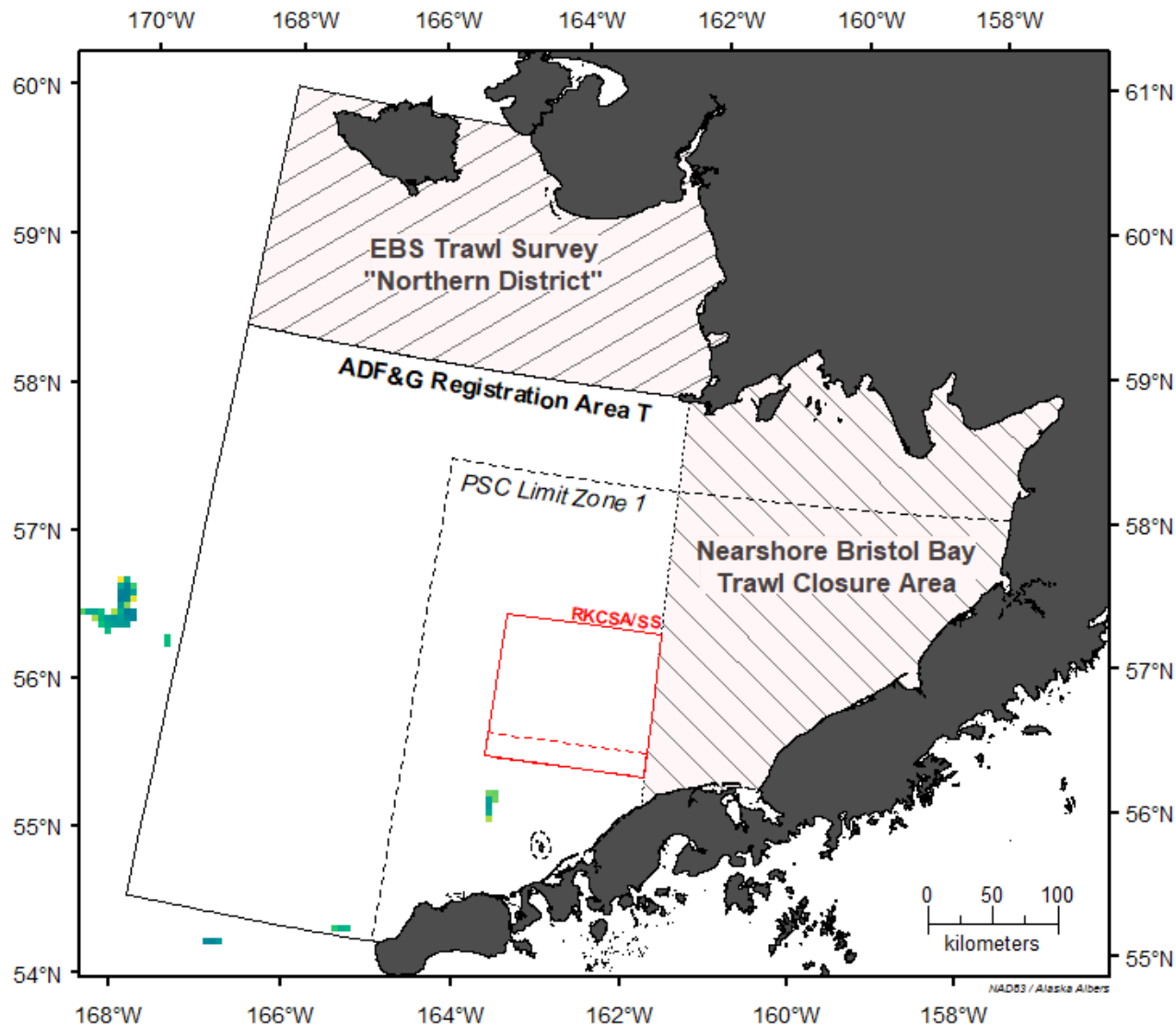


NAD83 / Alaska Albers

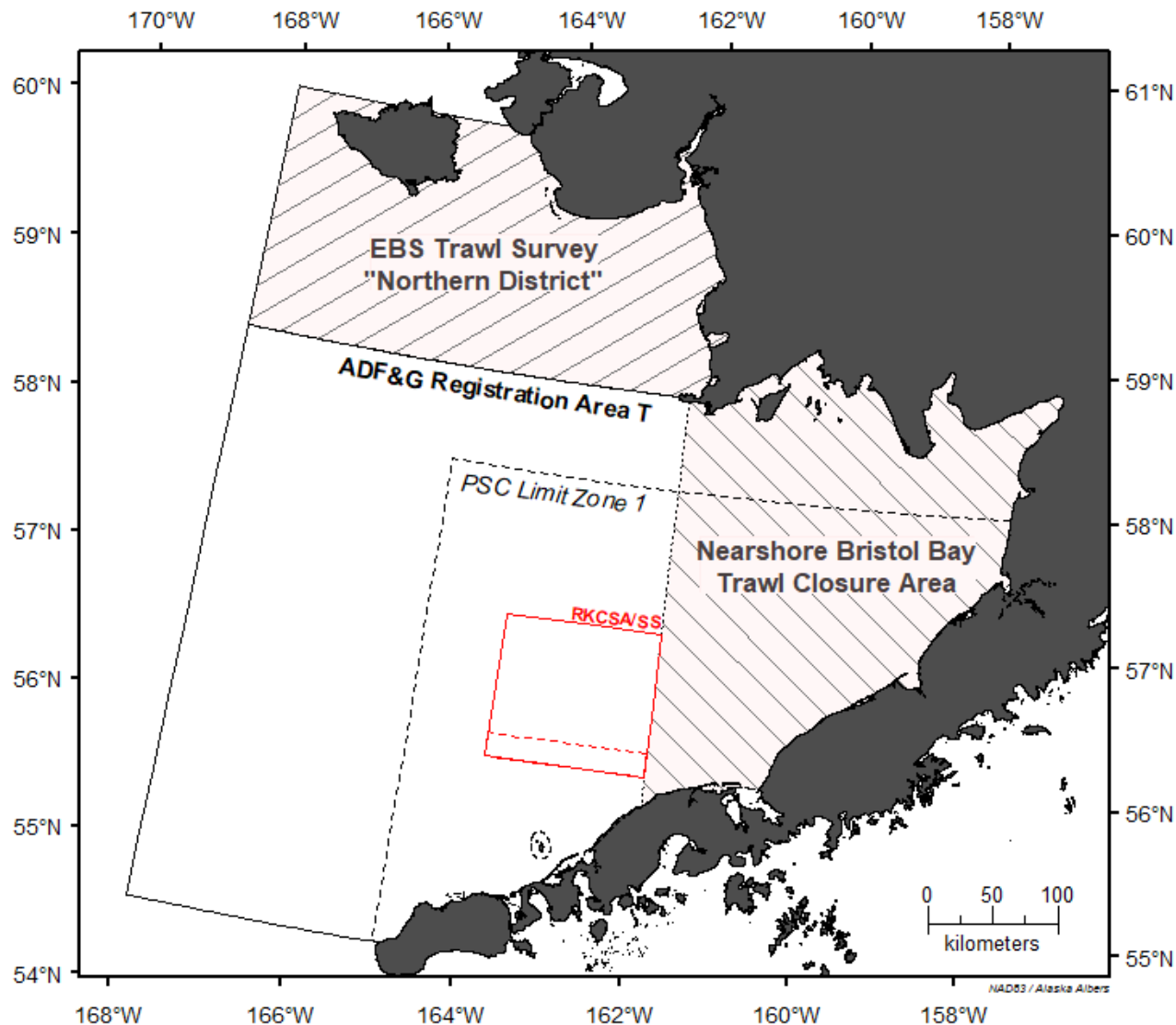
March 2009: Total Swept Area (SA), by PTR (1,656.6 km²)



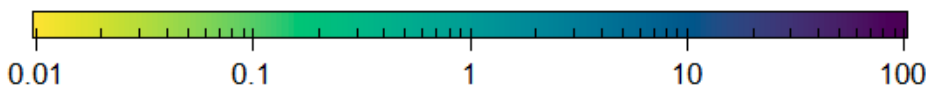
April 2009: Total Swept Area (SA), by PTR (5.9 km²)



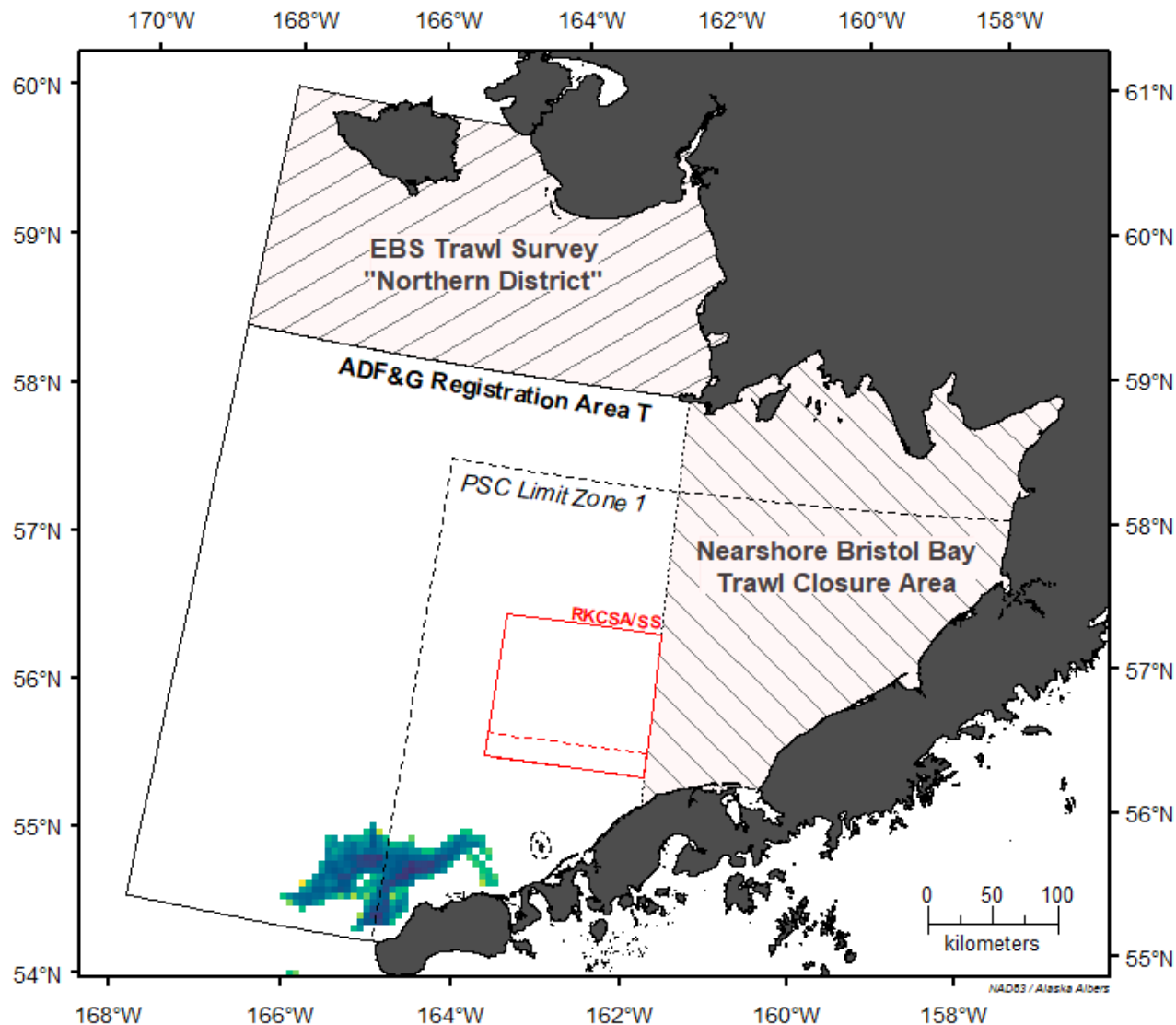
May 2009: Total Swept Area (SA), by PTR (0 km²)



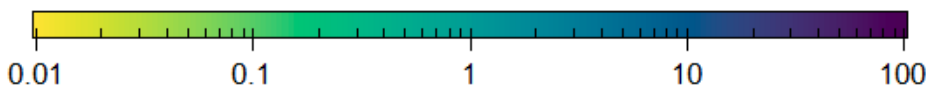
SA, km²



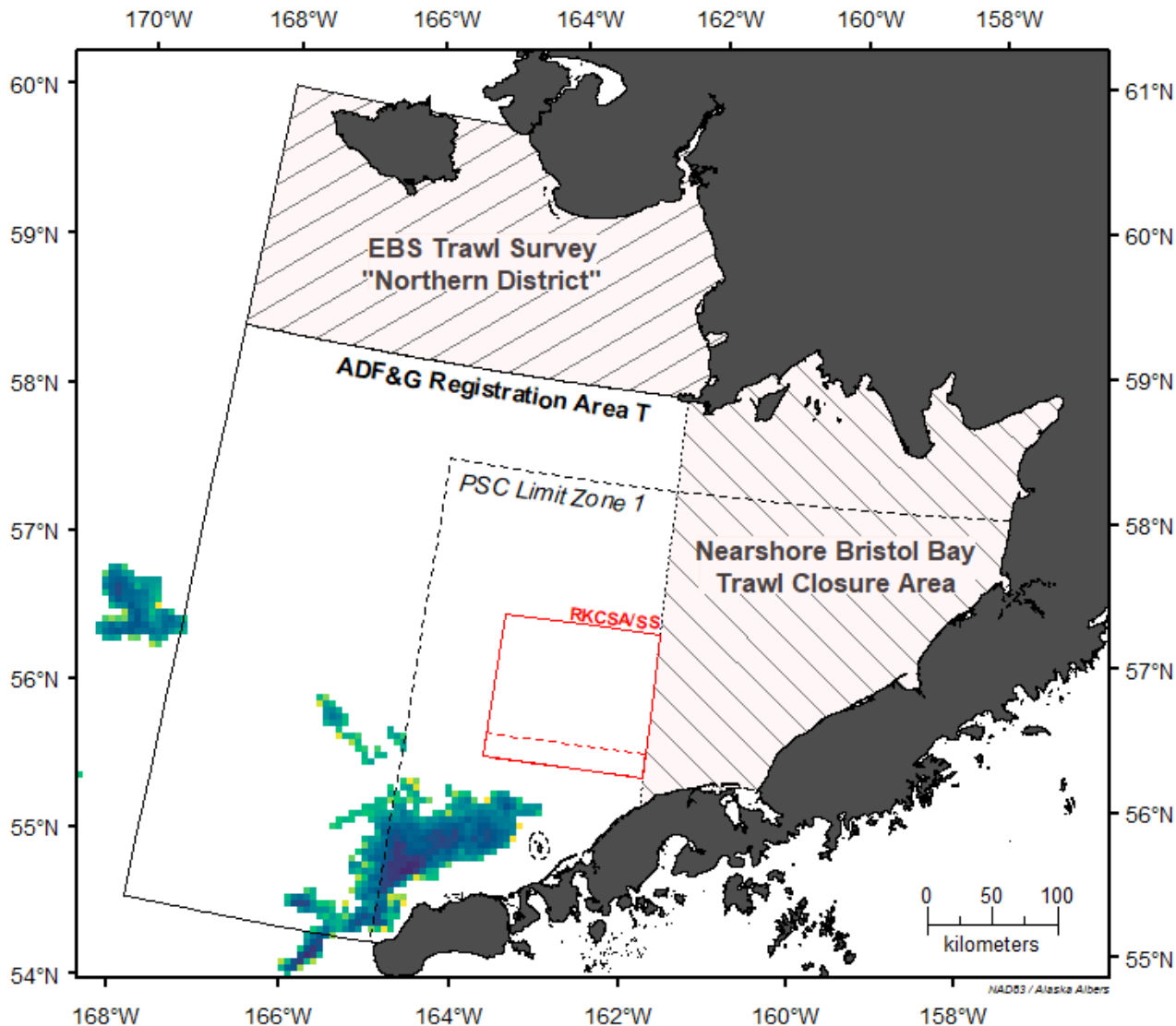
June 2009: Total Swept Area (SA), by PTR (2,337.5 km²)



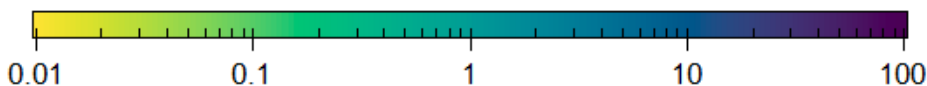
SA, km²



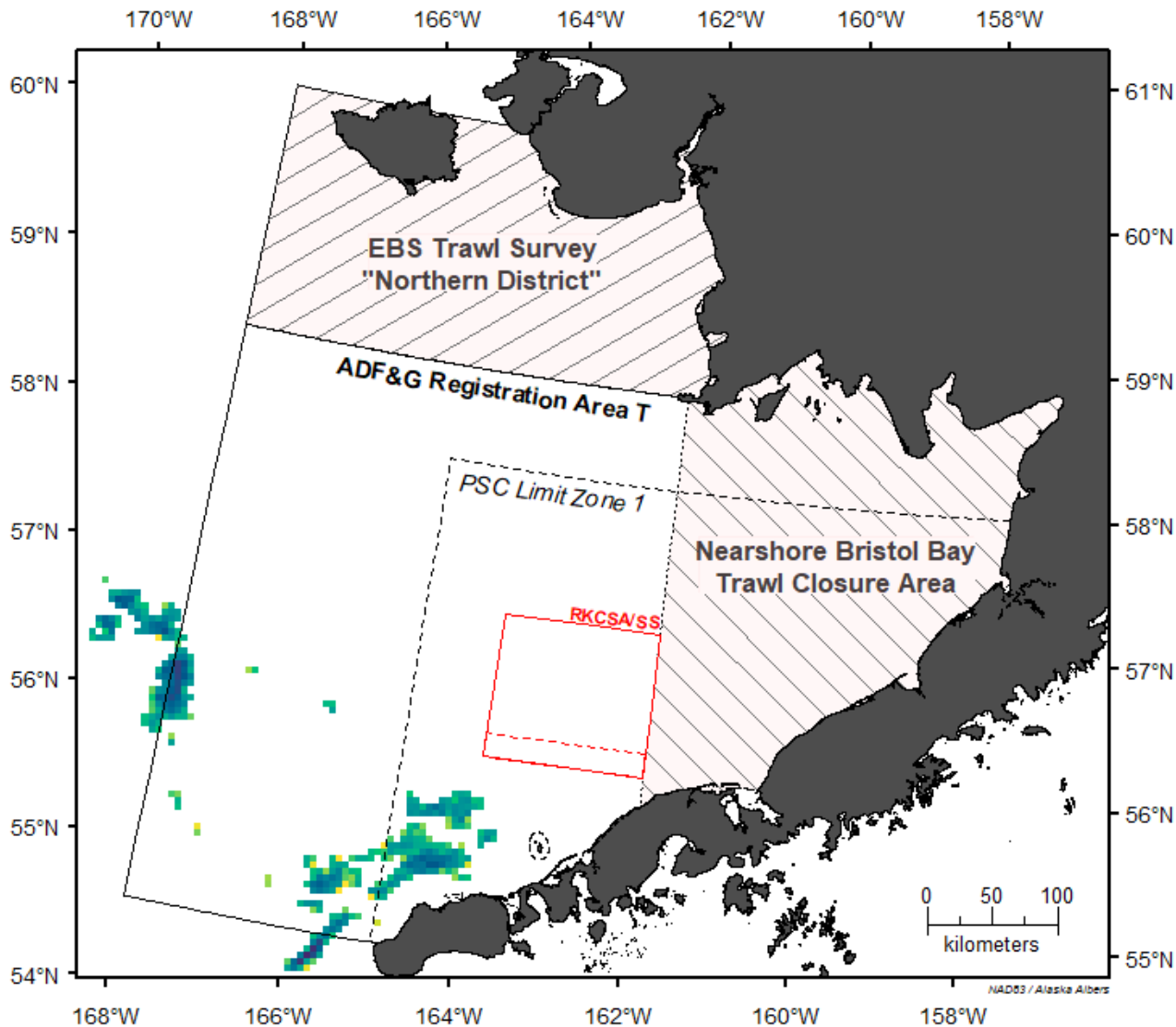
July 2009: Total Swept Area (SA), by PTR (4,052.5 km²)



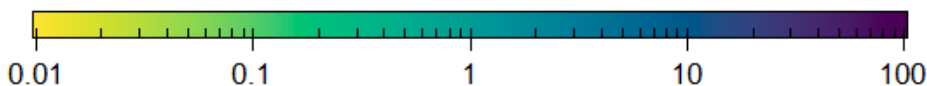
SA, km²



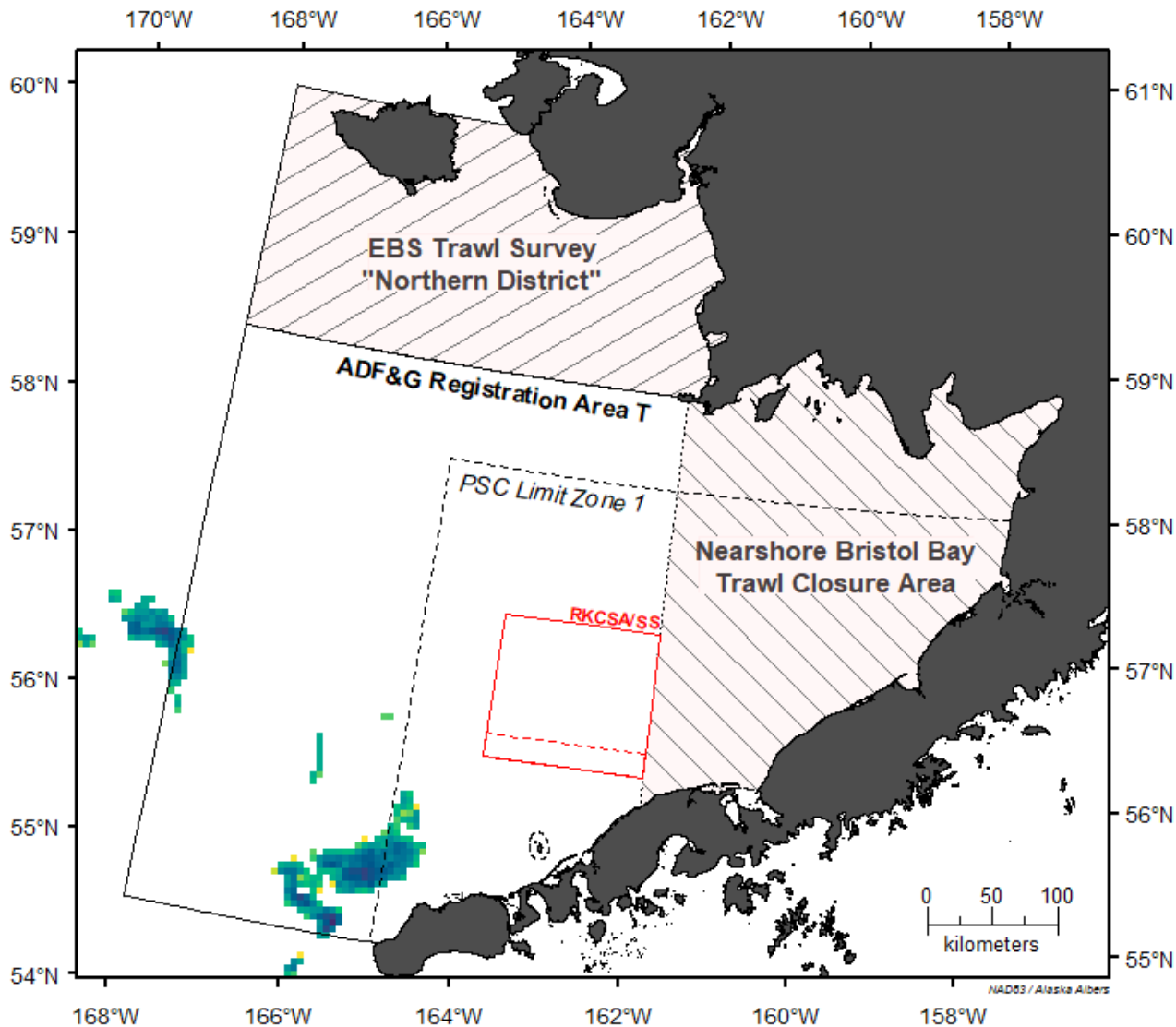
August 2009: Total Swept Area (SA), by PTR (713.3 km²)



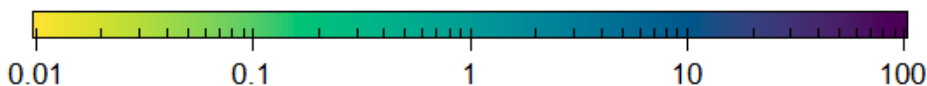
SA, km²



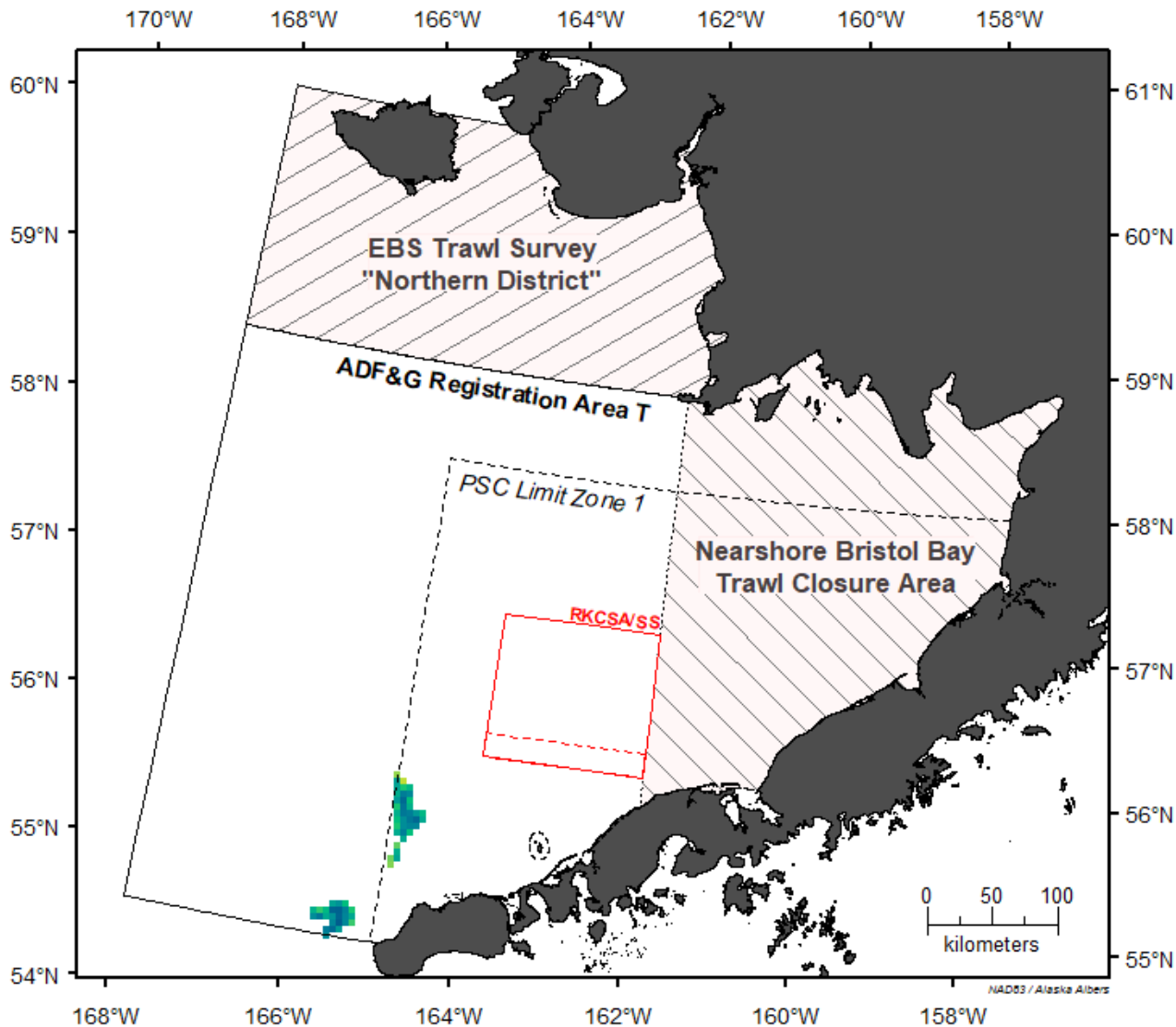
September 2009: Total Swept Area (SA), by PTR (863.3 km²)



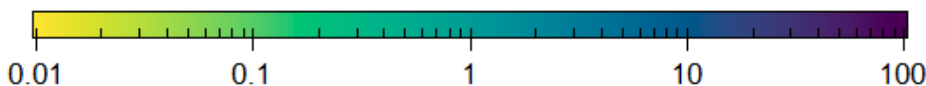
SA, km²



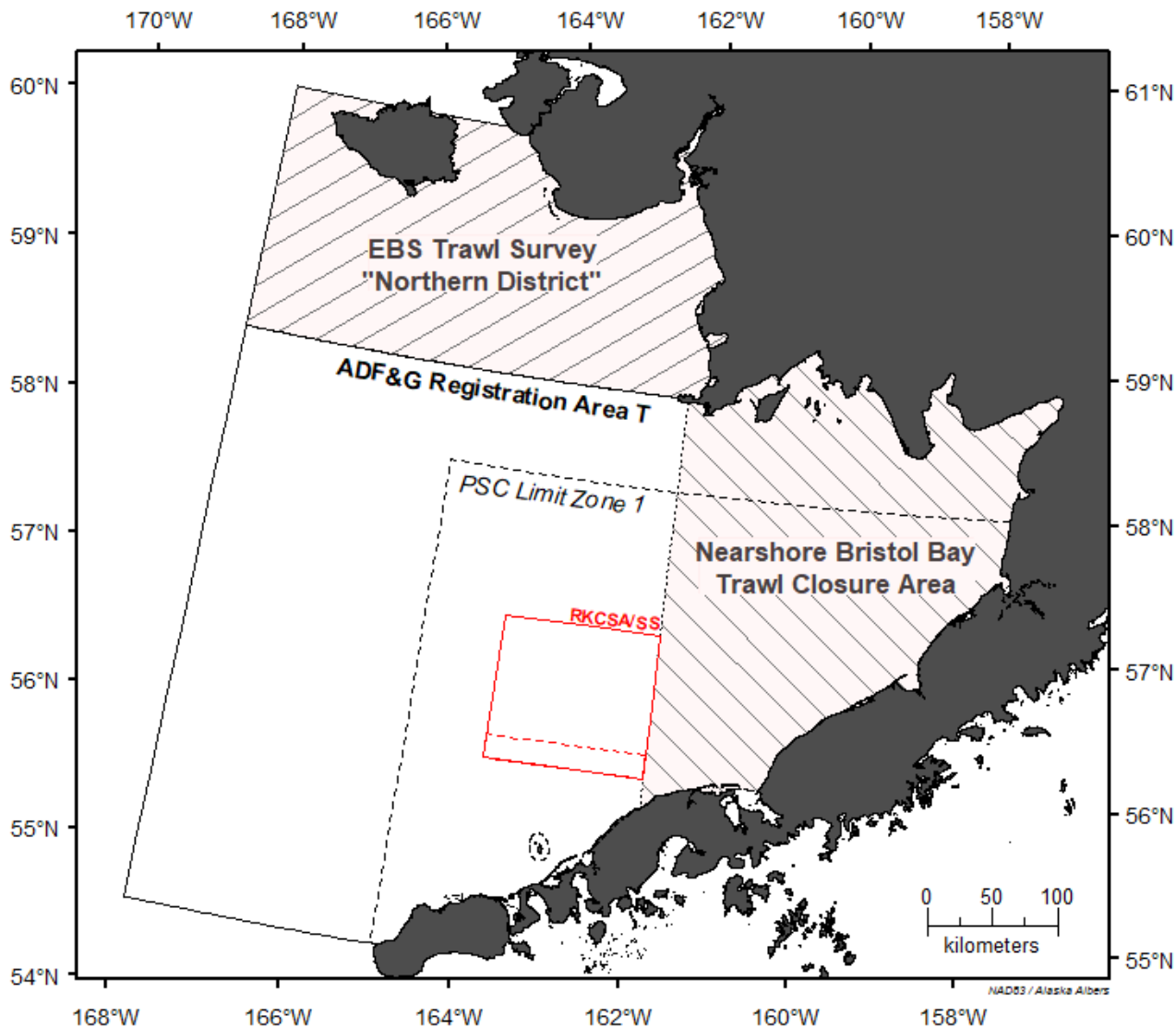
October 2009: Total Swept Area (SA), by PTR (166.7 km²)



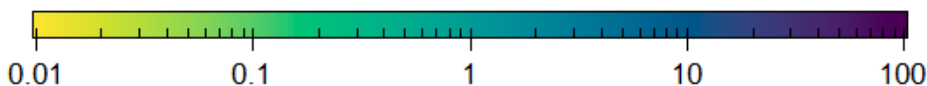
SA, km²



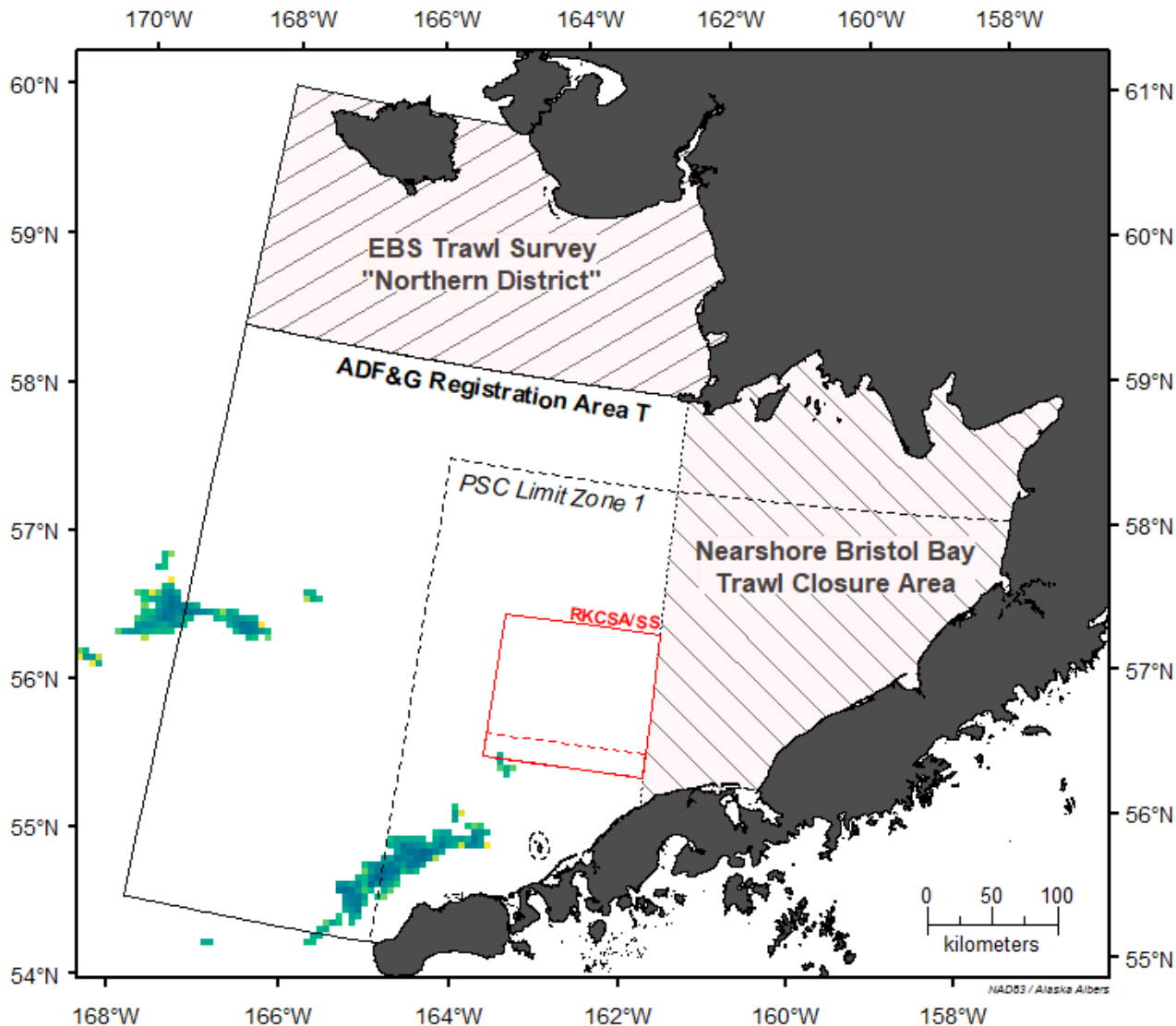
November 2009: Total Swept Area (SA), by PTR (0 km²)



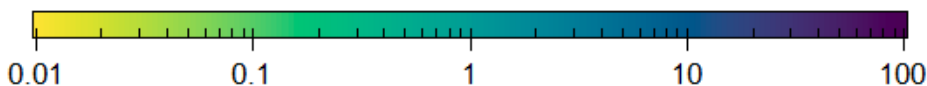
SA, km²



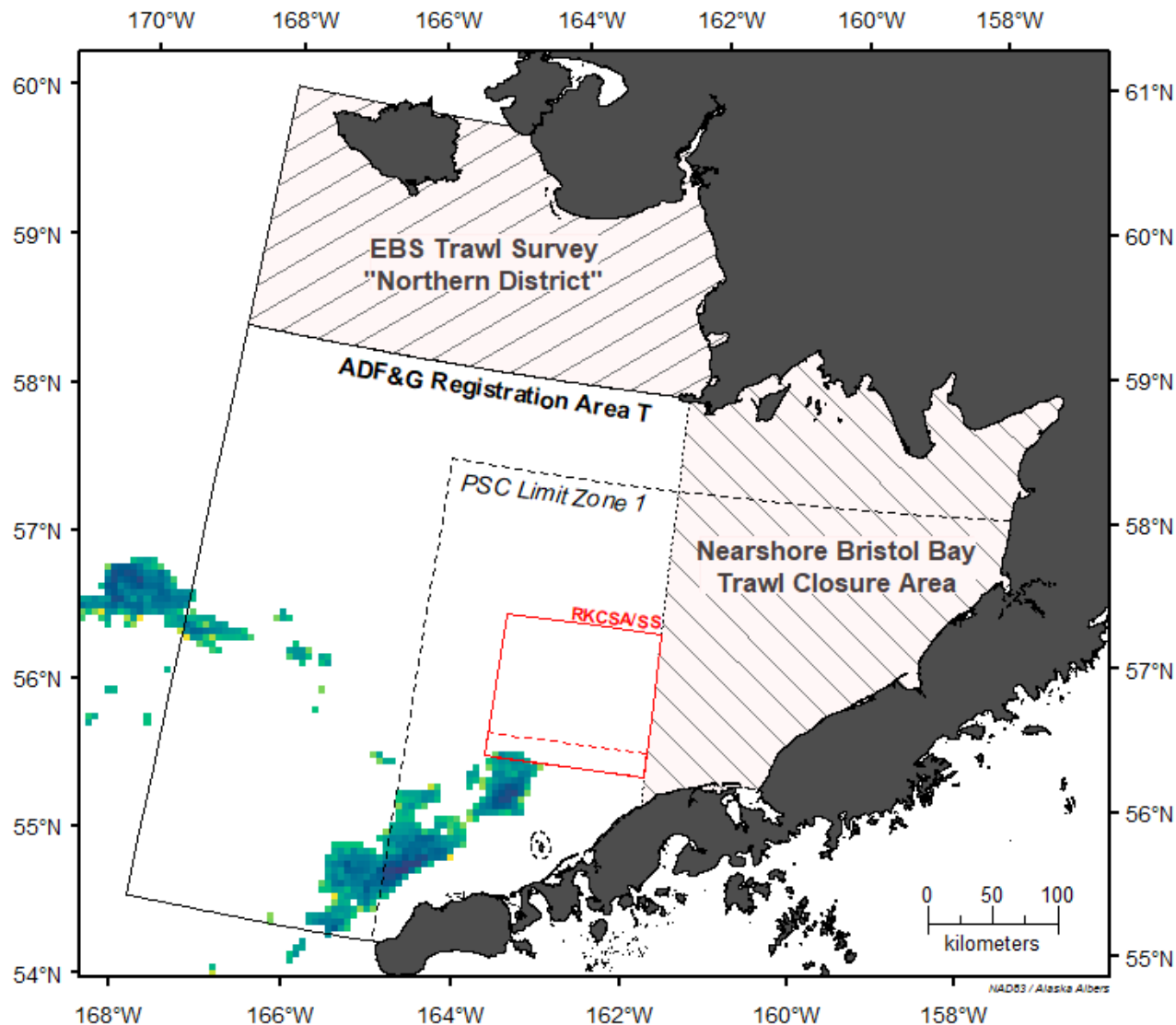
January 2010: Total Swept Area (SA), by PTR (441.8 km²)



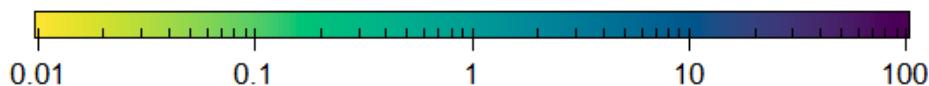
SA, km²



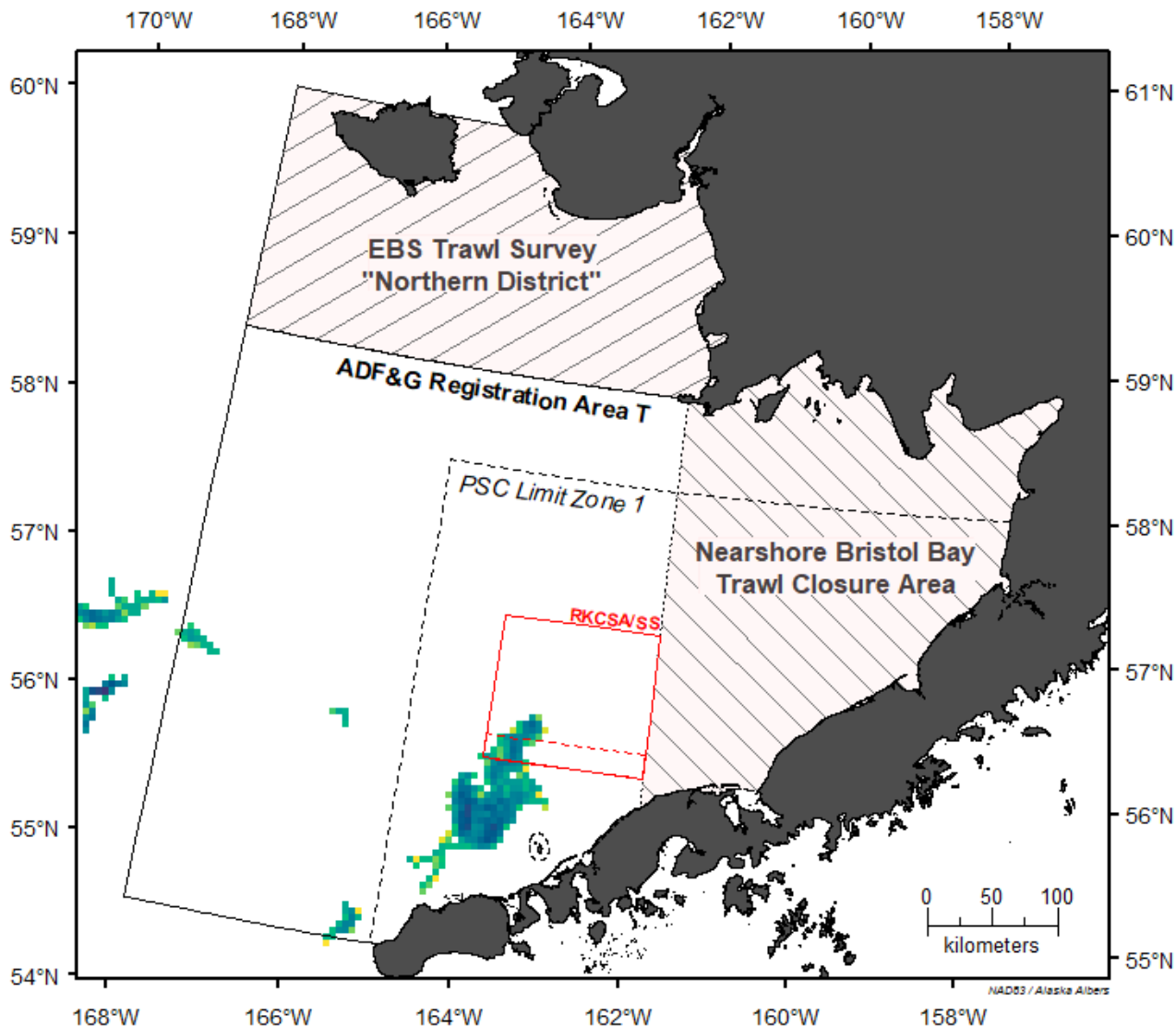
February 2010: Total Swept Area (SA), by PTR (1,785.3 km²)



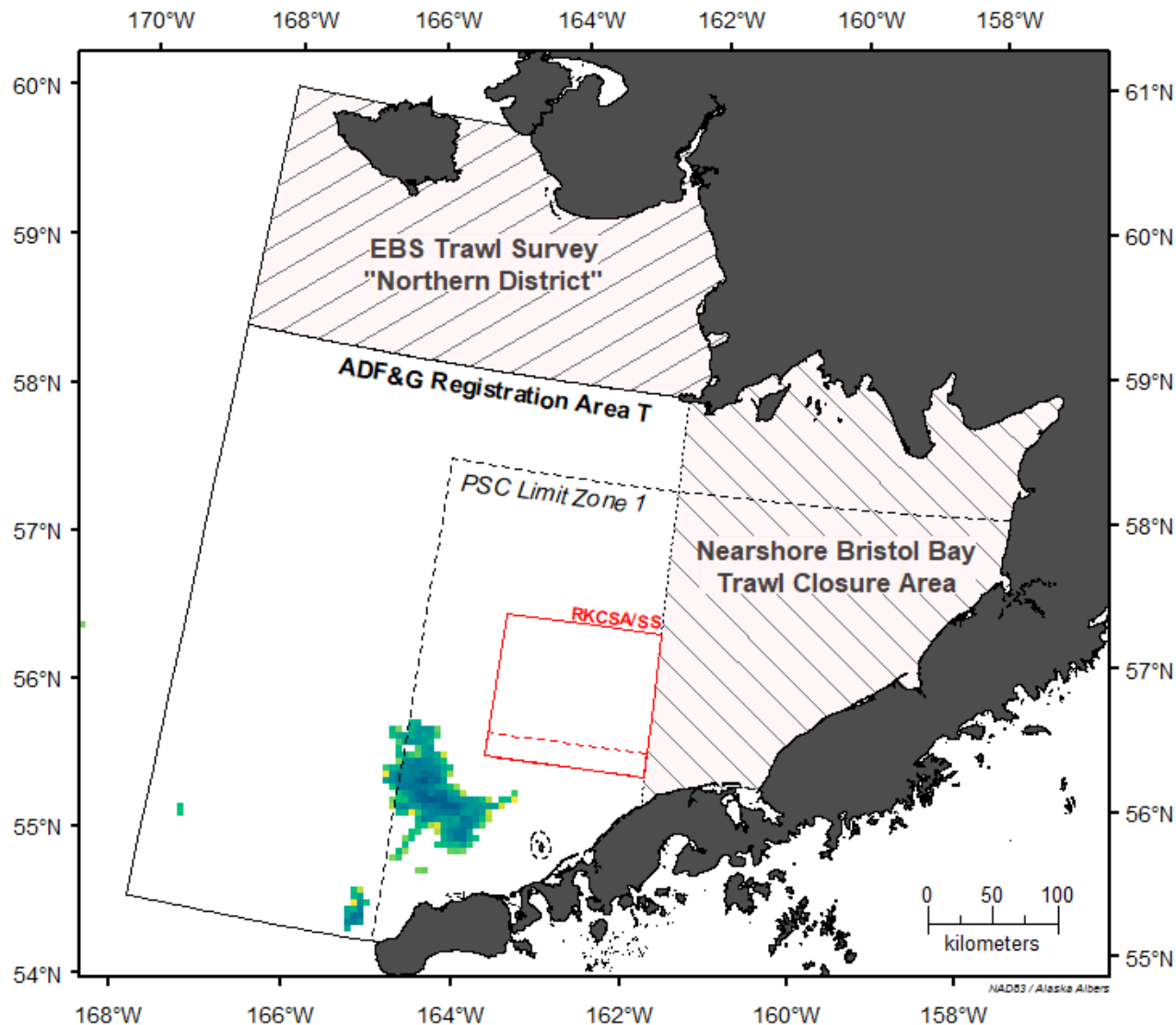
SA, km²



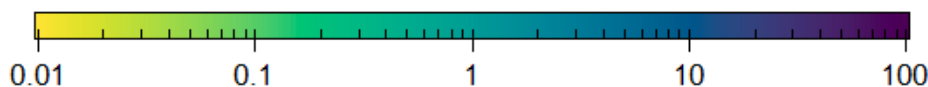
March 2010: Total Swept Area (SA), by PTR (1,115.8 km²)



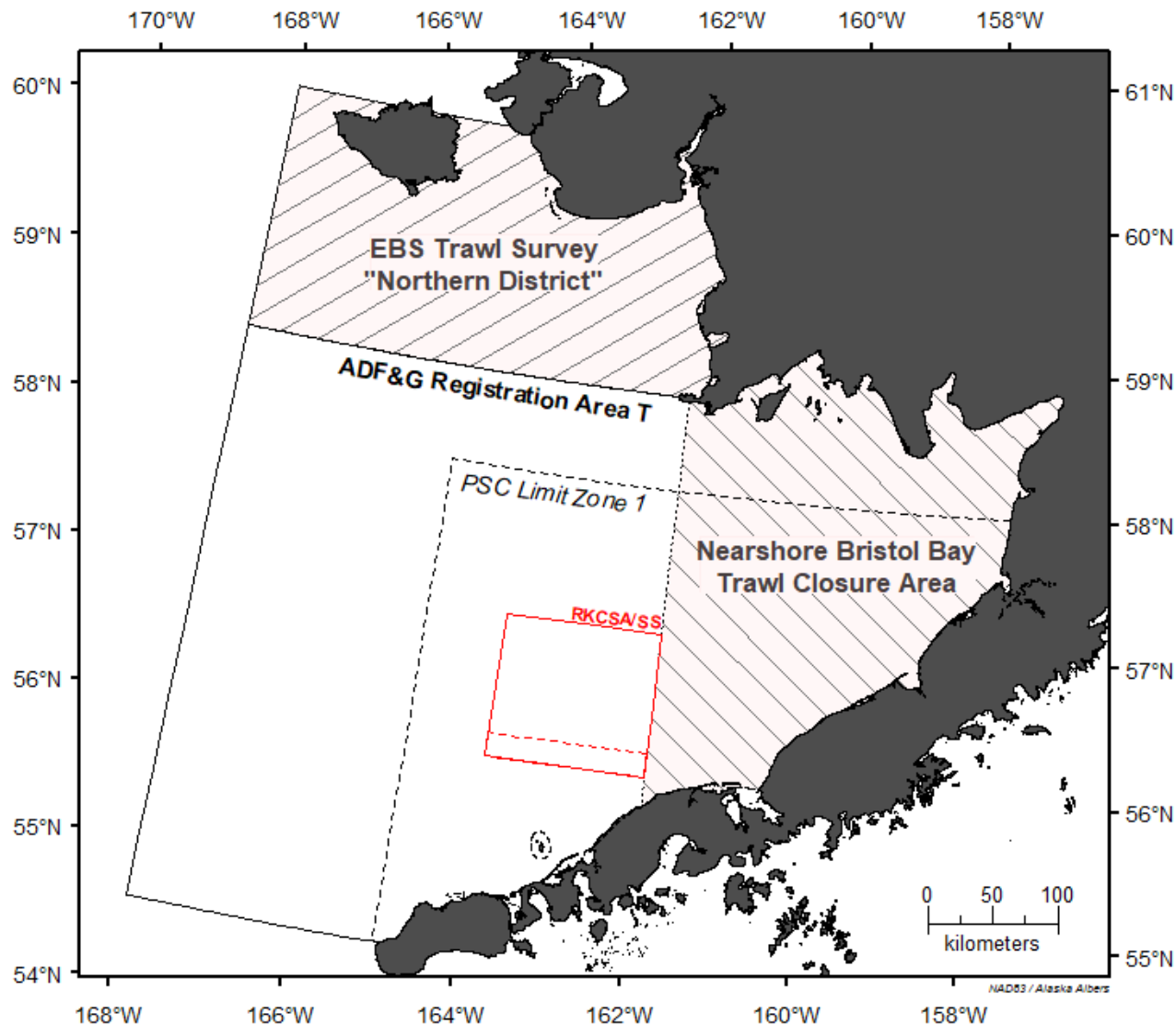
April 2010: Total Swept Area (SA), by PTR (709.4 km²)



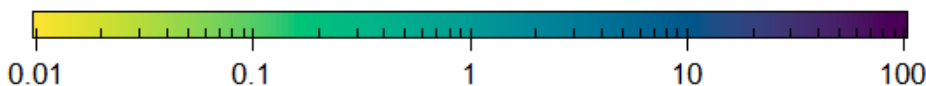
SA, km²



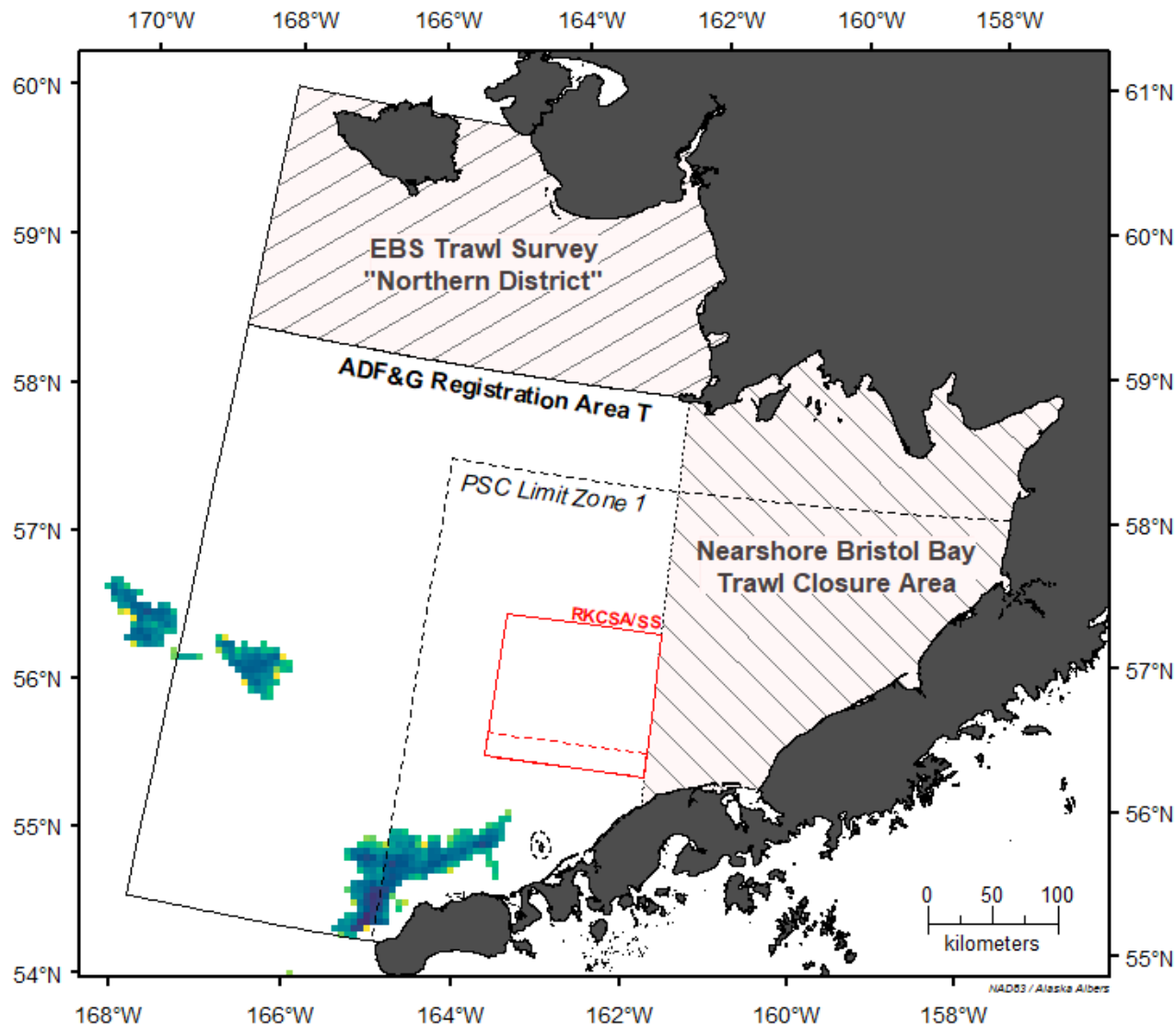
May 2010: Total Swept Area (SA), by PTR (0 km²)



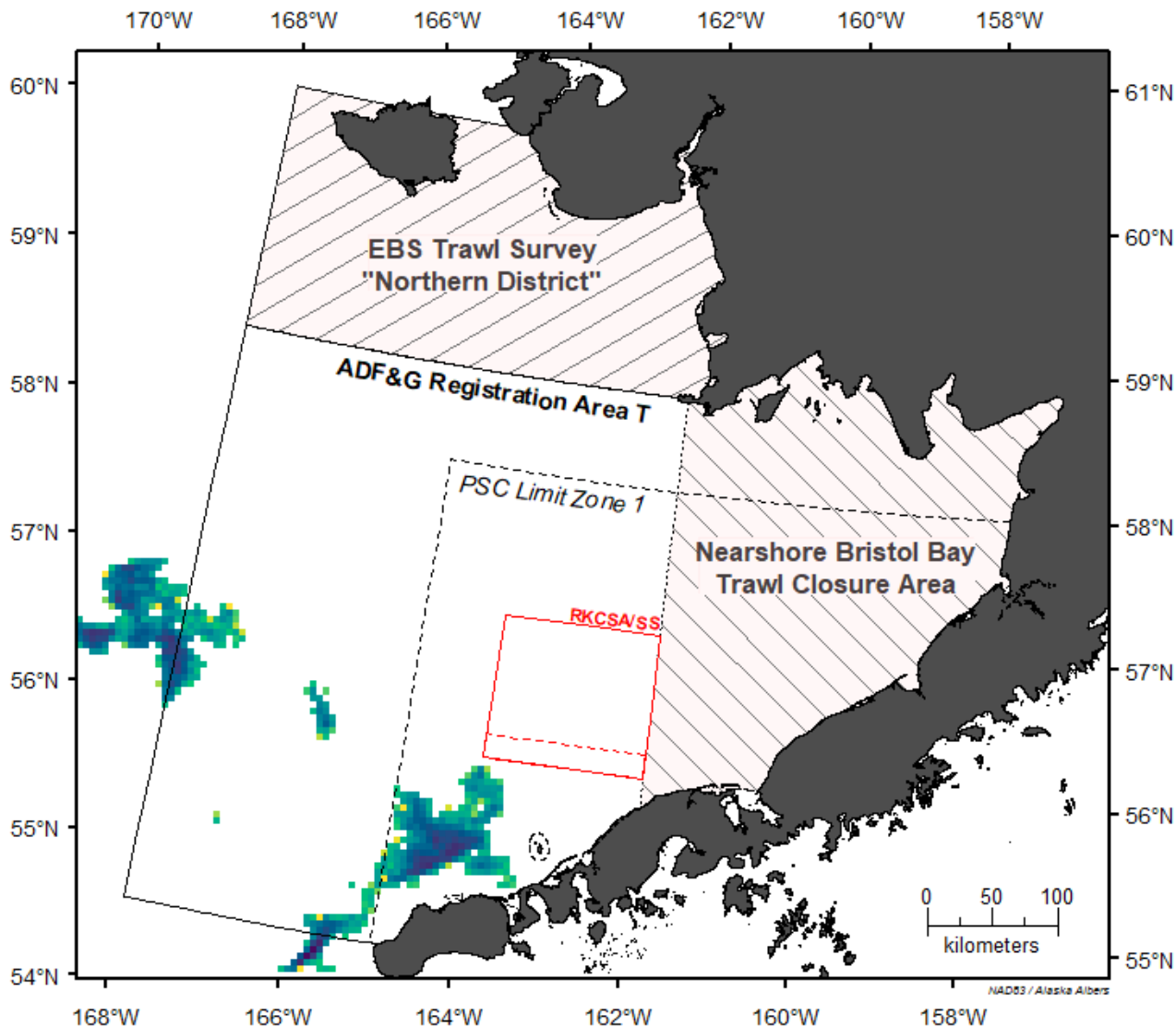
SA, km²



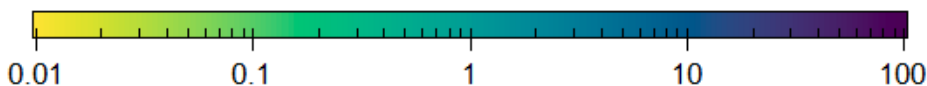
June 2010: Total Swept Area (SA), by PTR (1,851.1 km²)



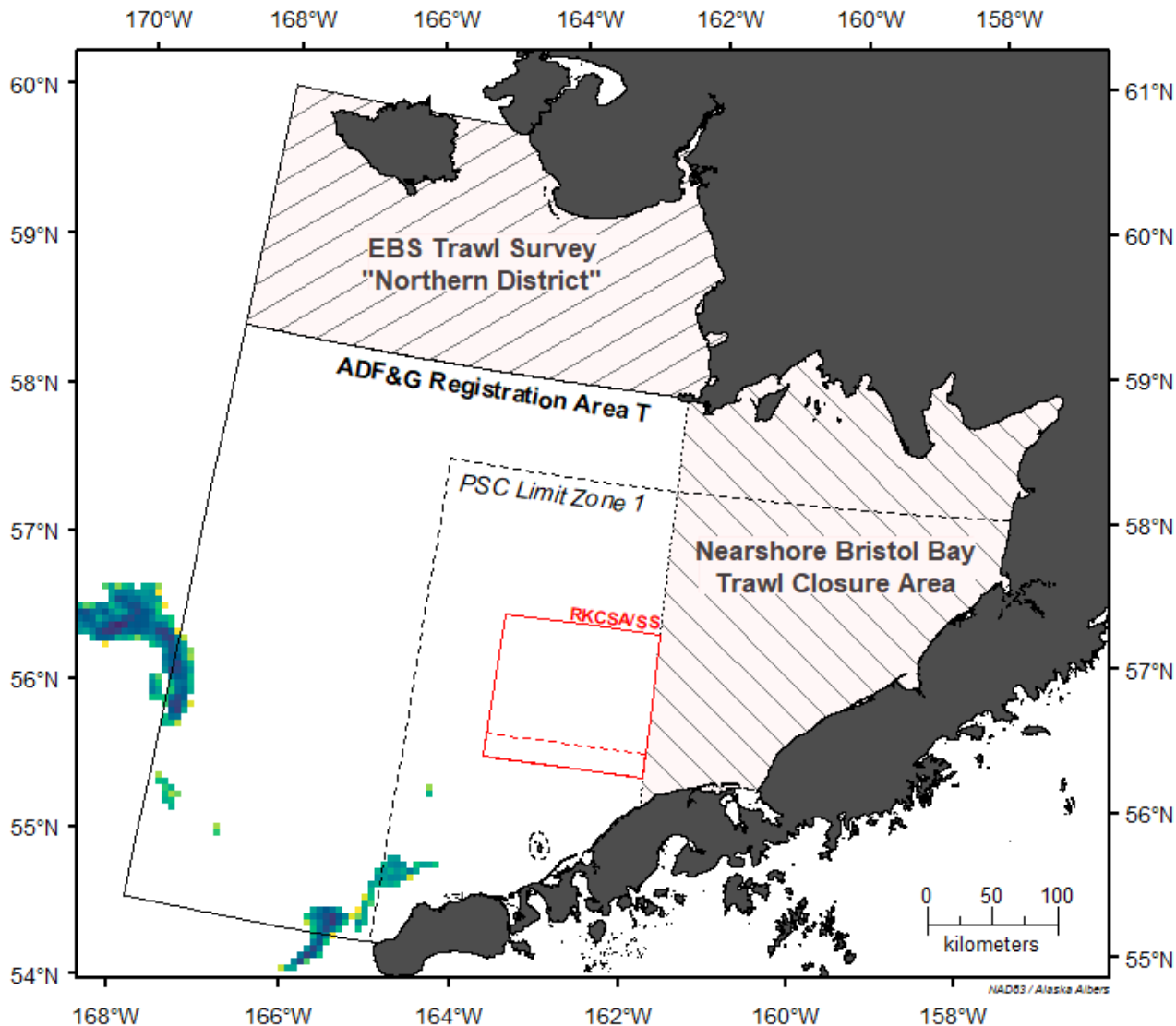
July 2010: Total Swept Area (SA), by PTR (2,756.5 km²)



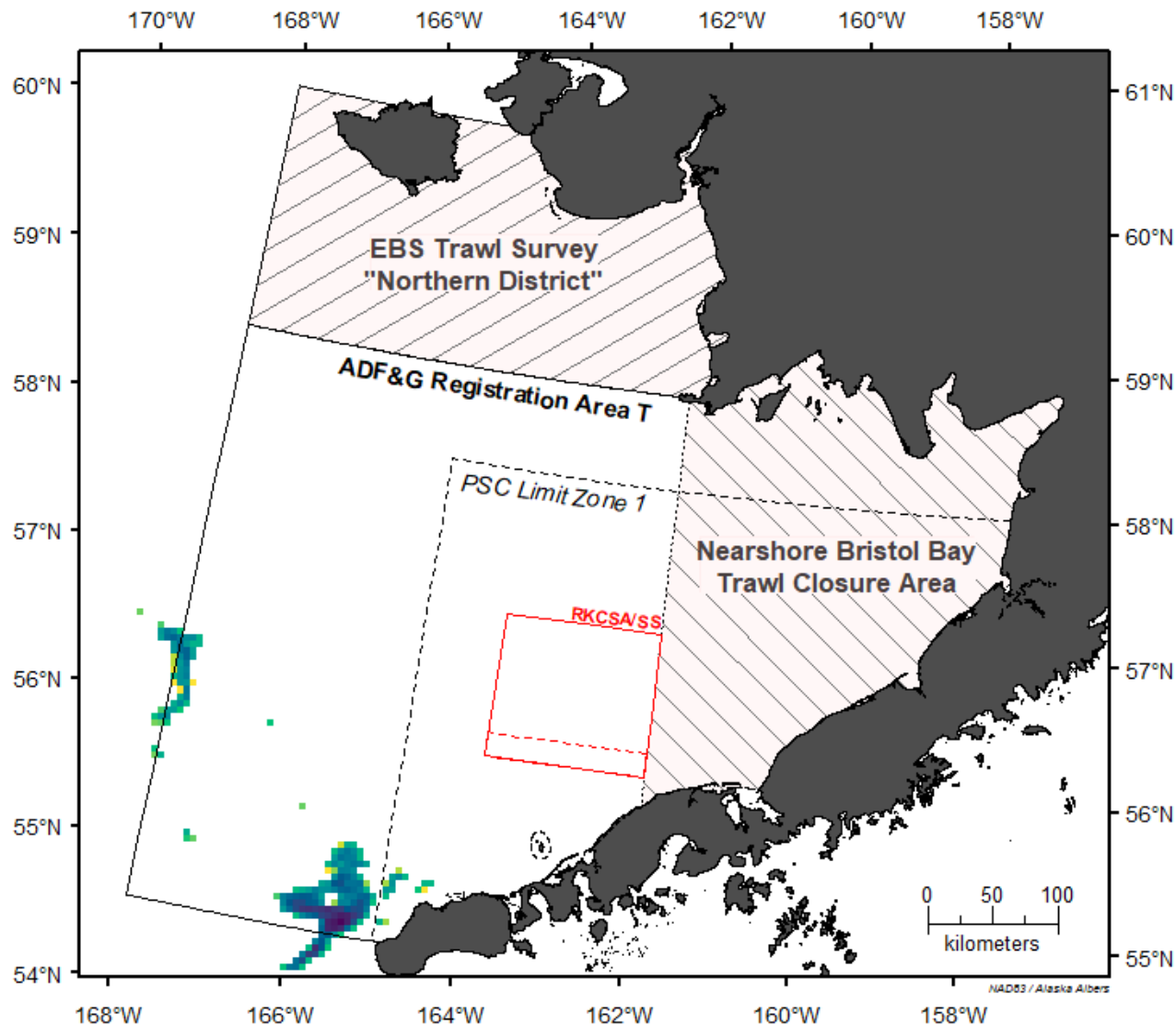
SA, km²



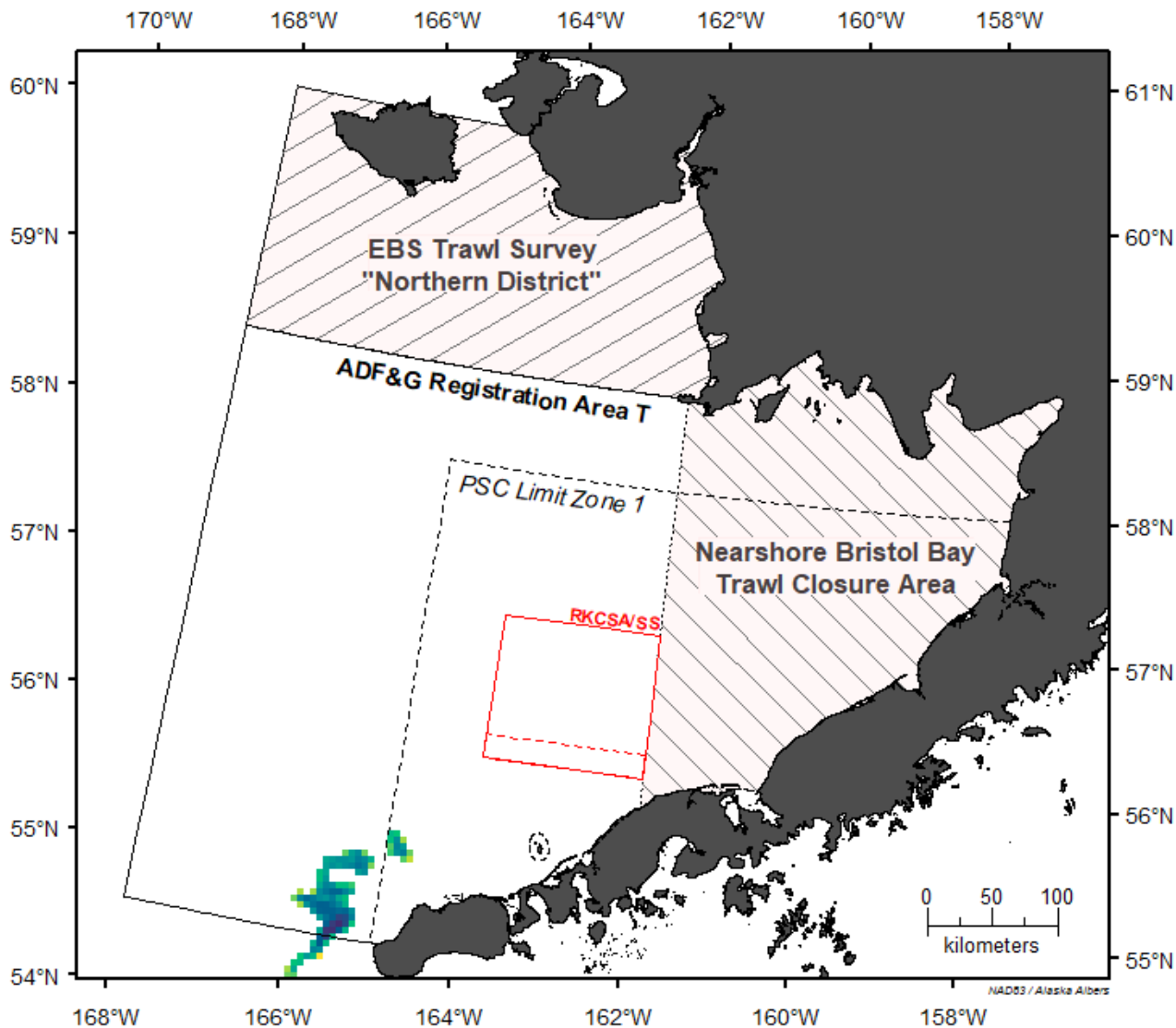
August 2010: Total Swept Area (SA), by PTR (510.7 km²)



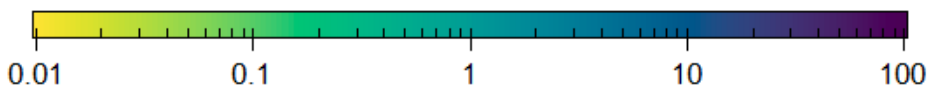
September 2010: Total Swept Area (SA), by PTR (1,297.3 km²)



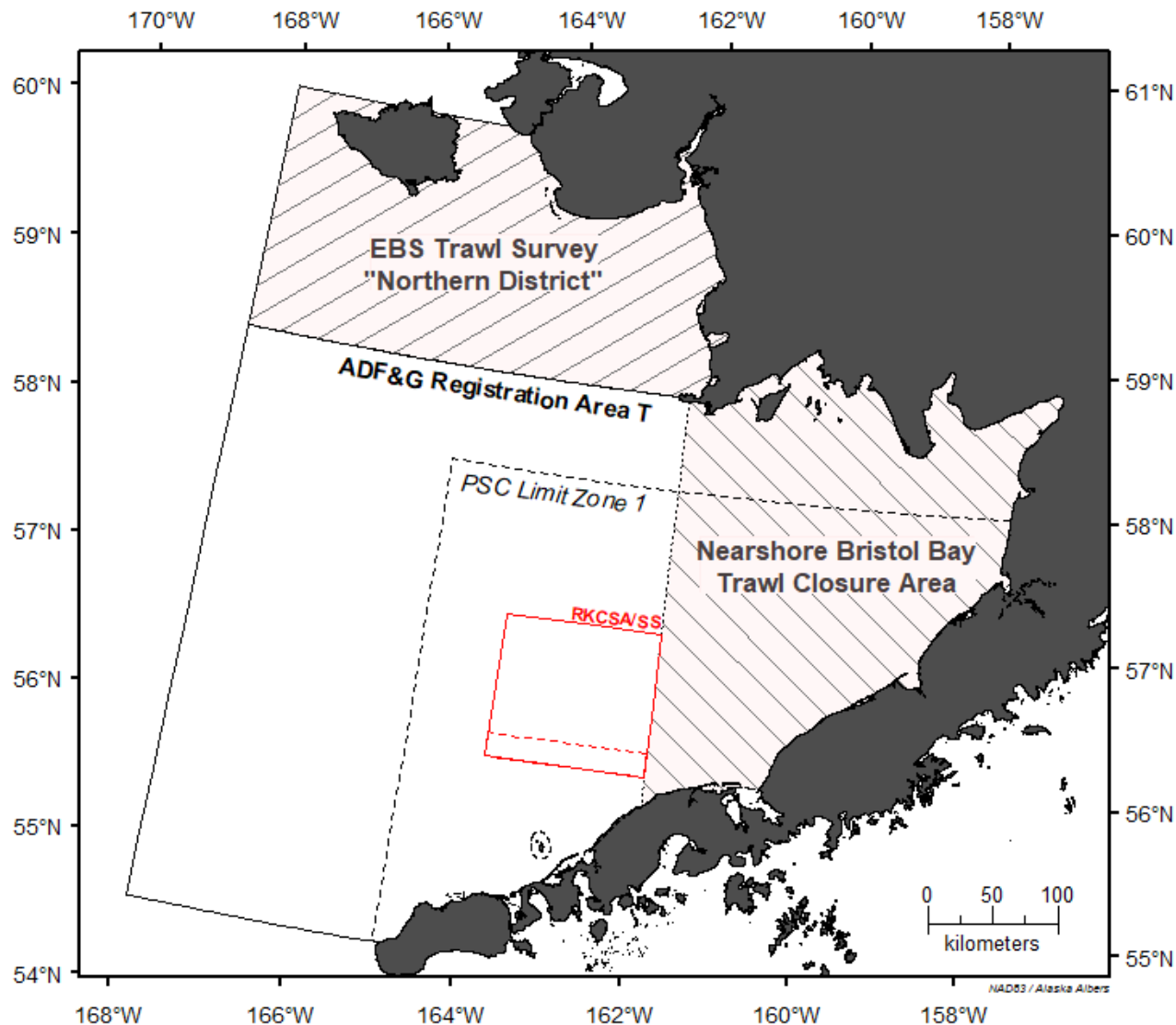
October 2010: Total Swept Area (SA), by PTR (400.9 km²)



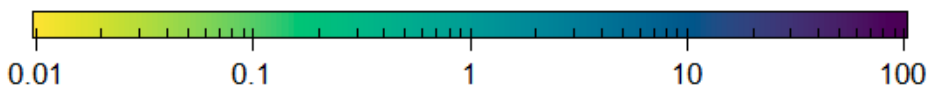
SA, km²



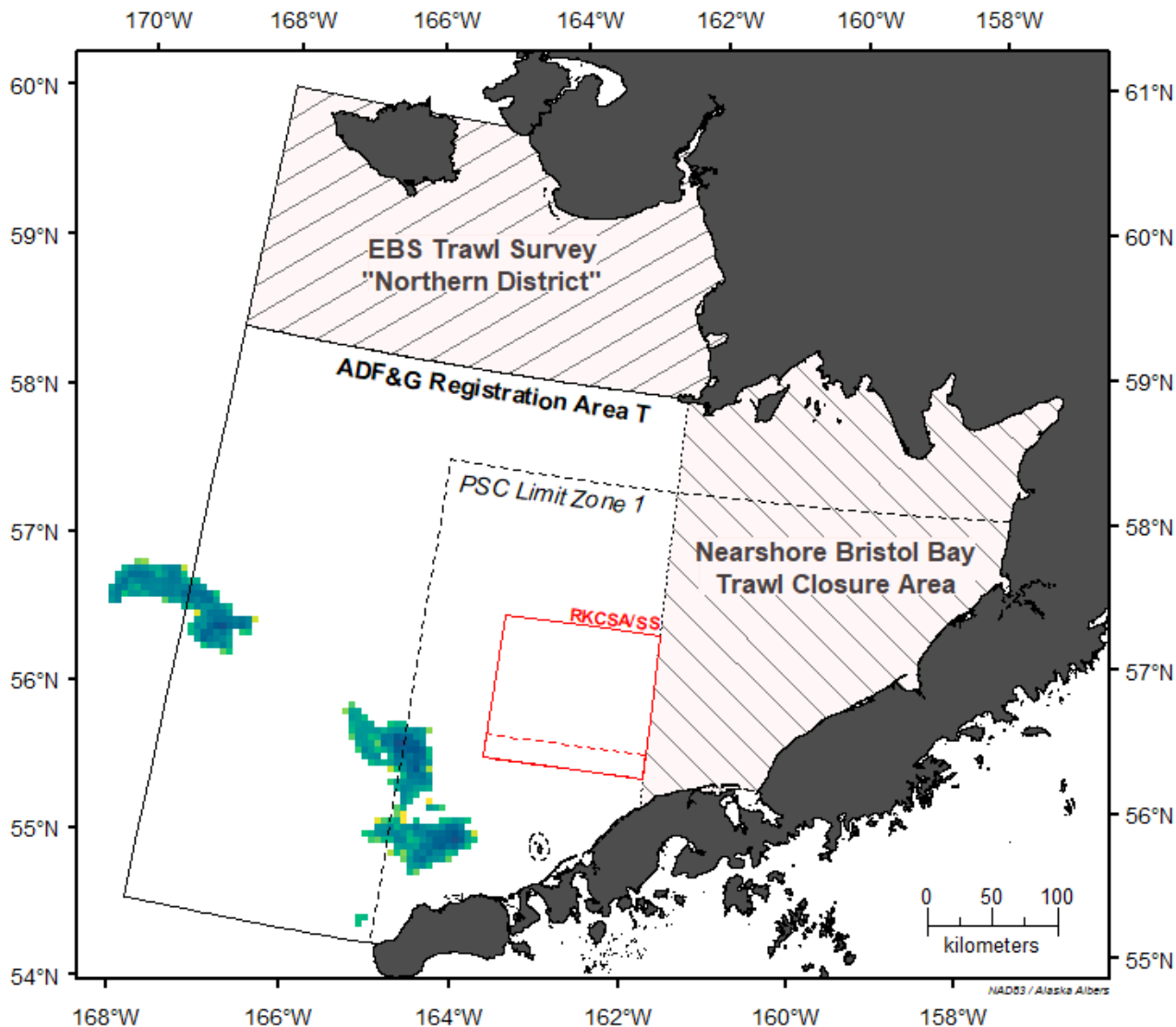
November 2010: Total Swept Area (SA), by PTR (0 km²)



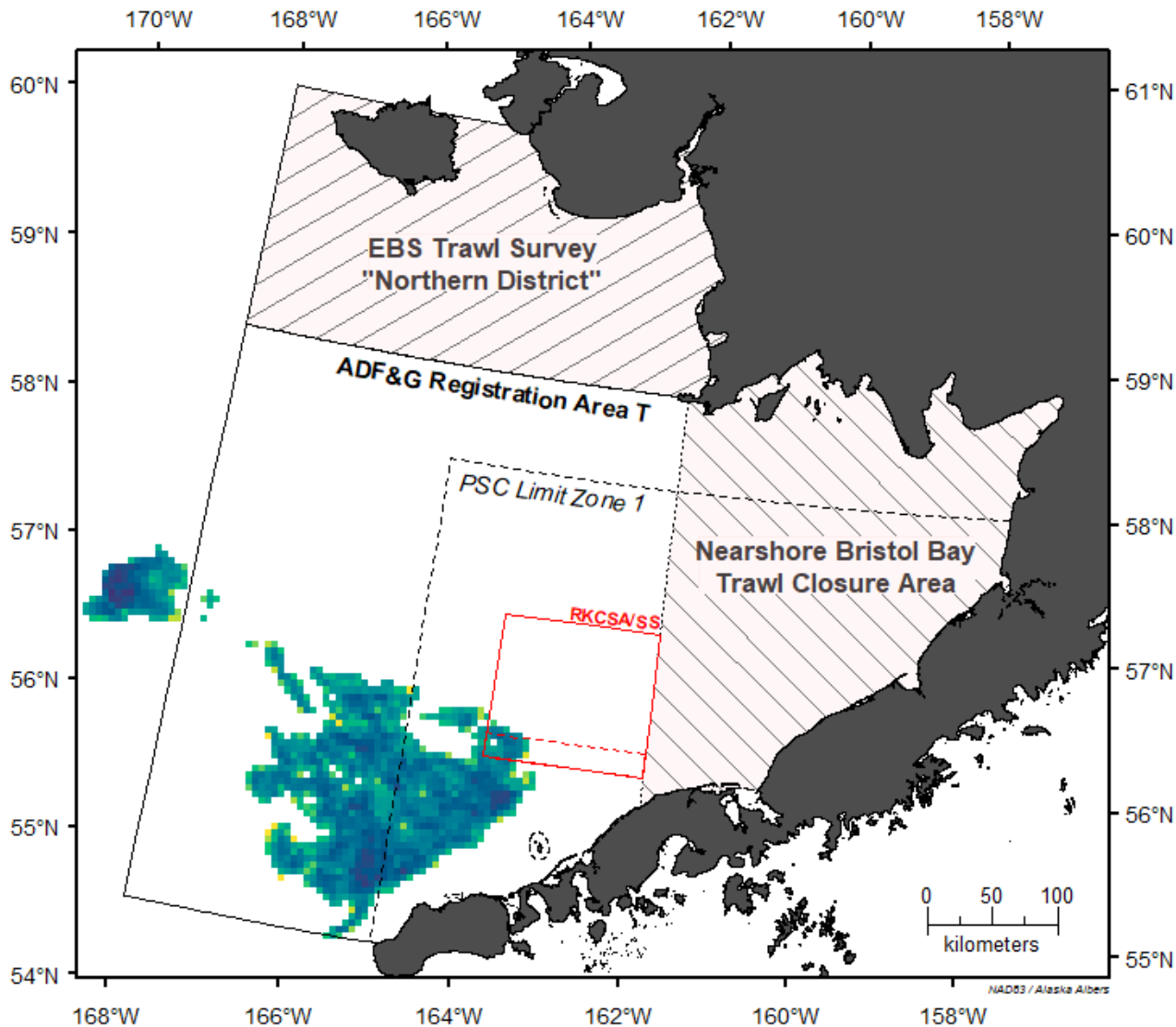
SA, km²



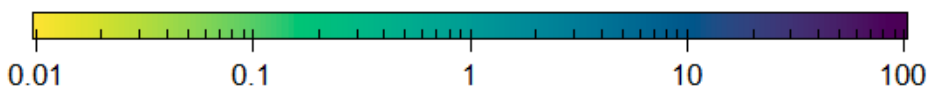
January 2011: Total Swept Area (SA), by PTR (1,112.8 km²)



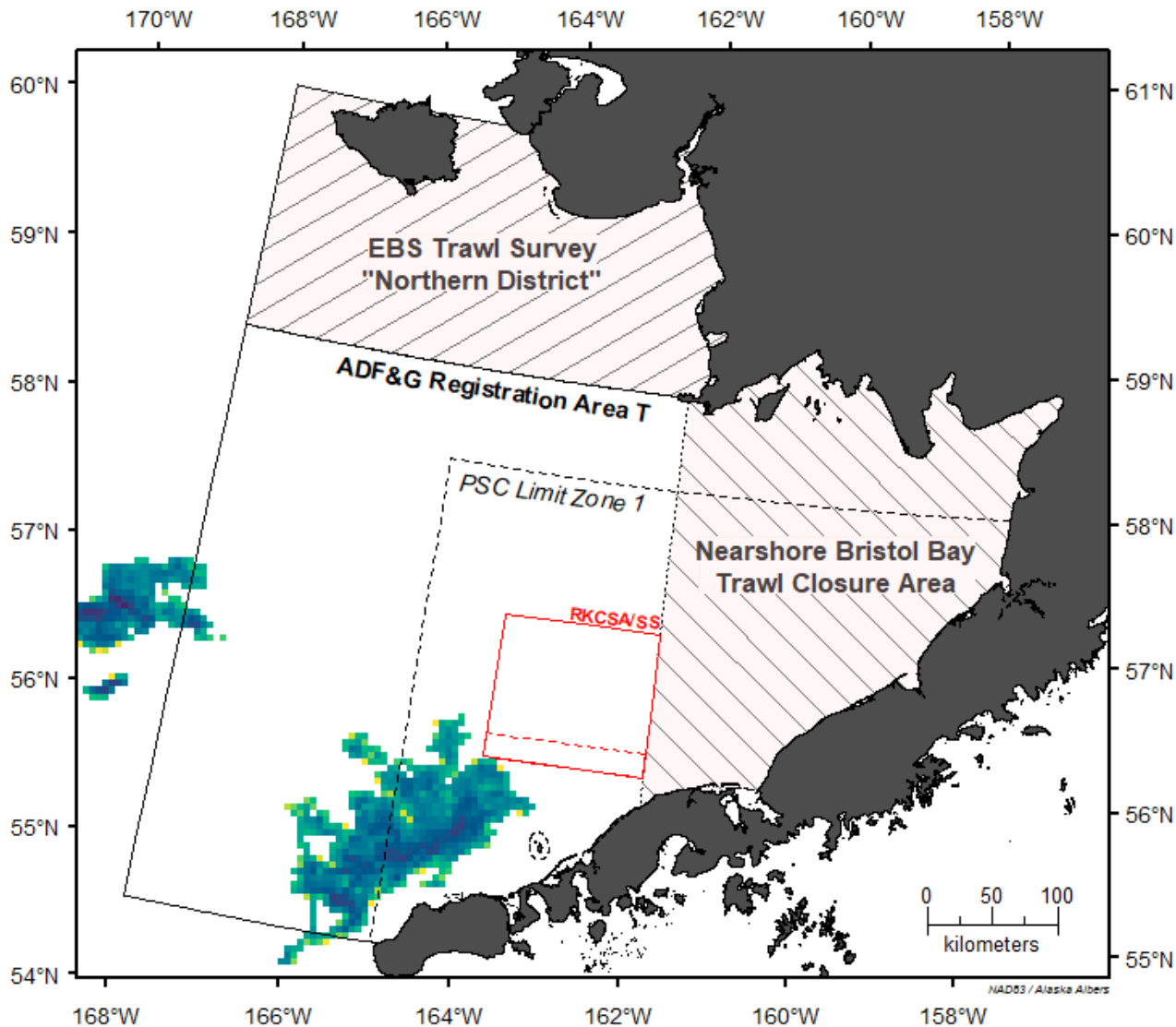
February 2011: Total Swept Area (SA), by PTR (5,271.7 km²)



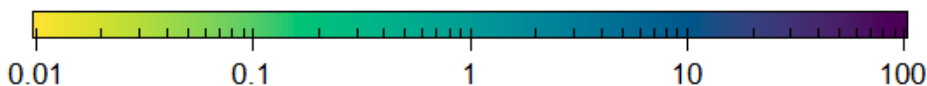
SA, km²



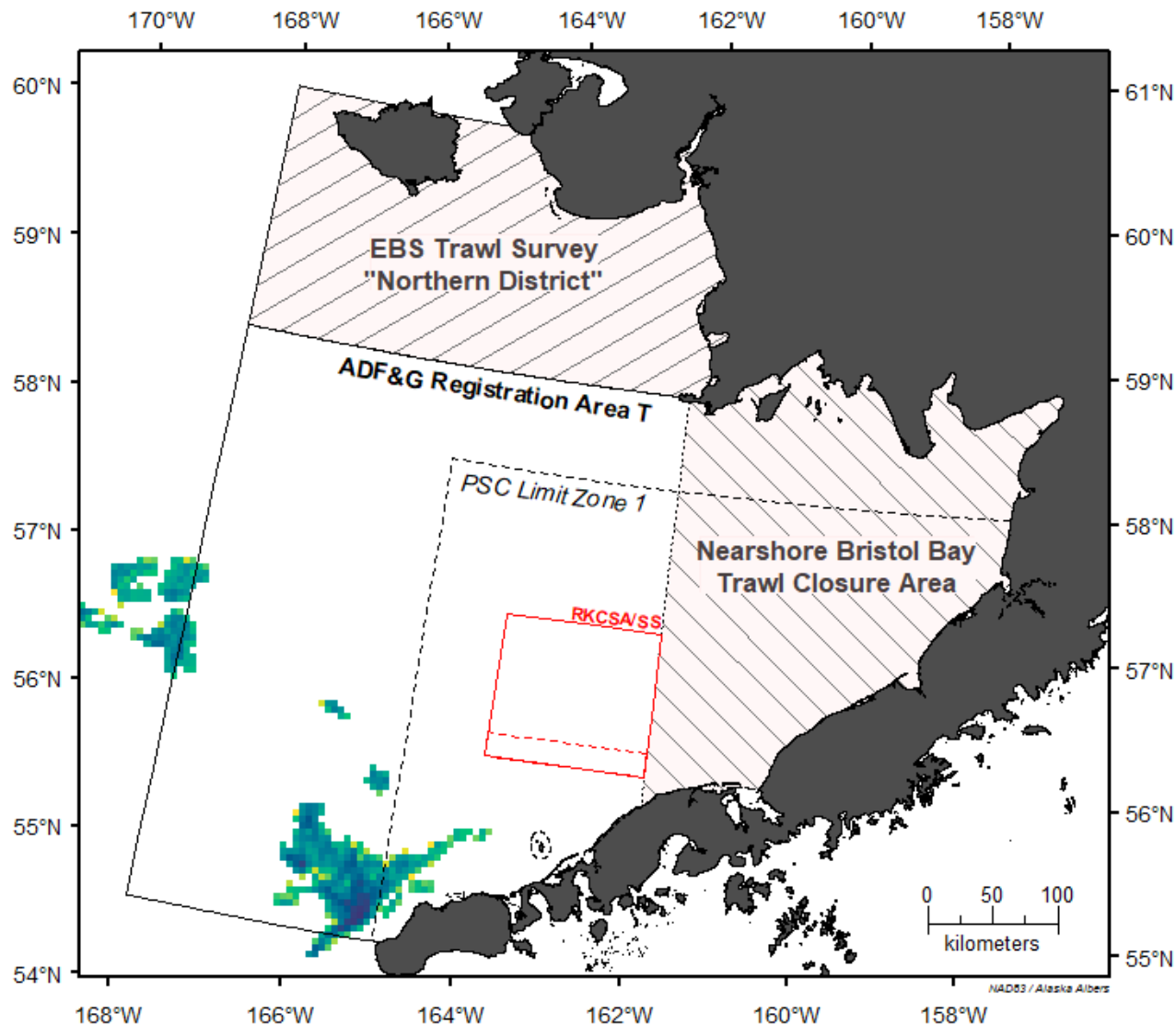
March 2011: Total Swept Area (SA), by PTR (3,597.9 km²)



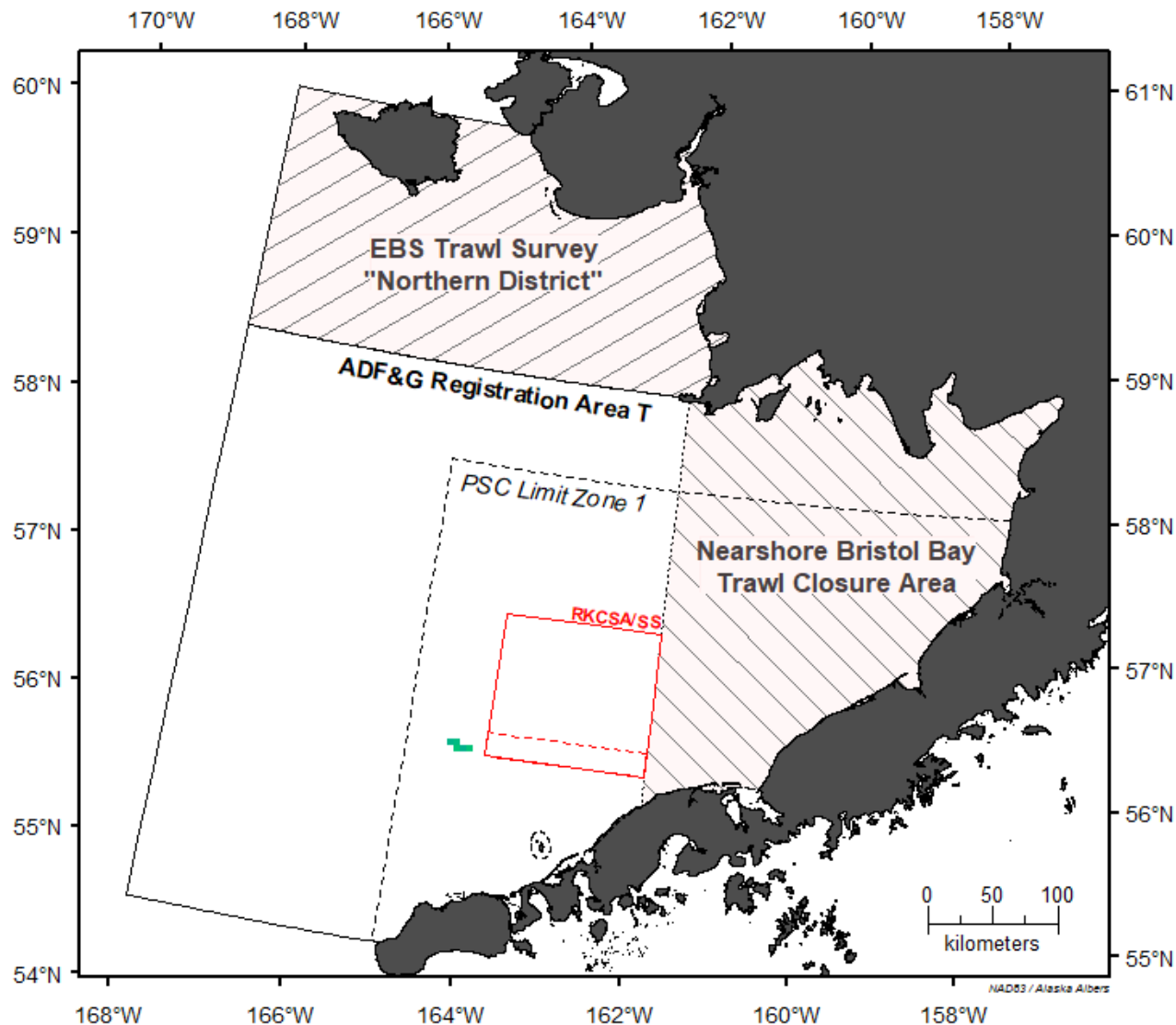
SA, km²



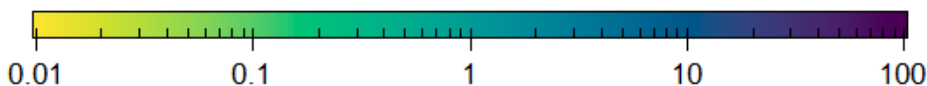
April 2011: Total Swept Area (SA), by PTR (996.4 km²)



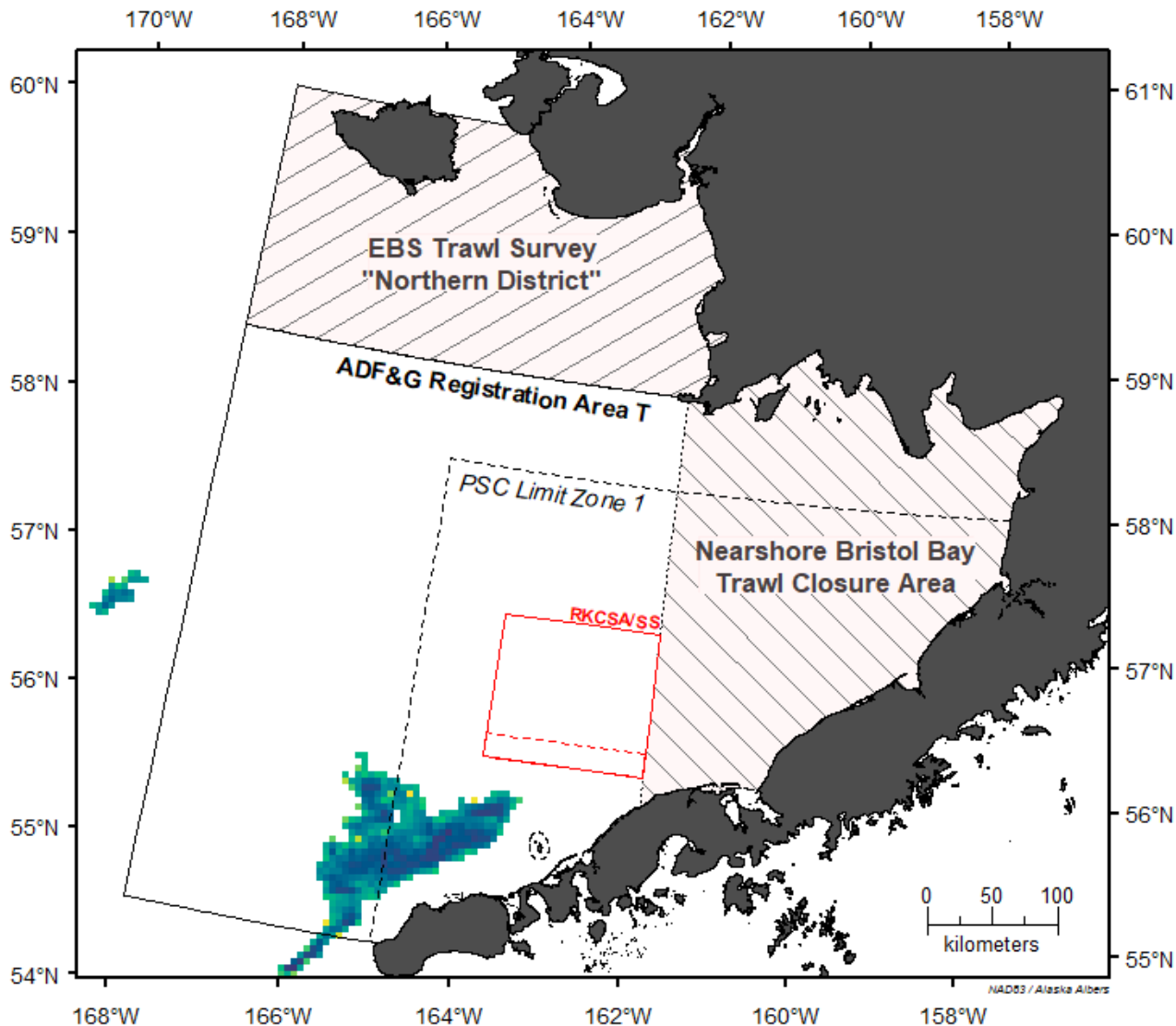
May 2011: Total Swept Area (SA), by PTR (2.8 km²)



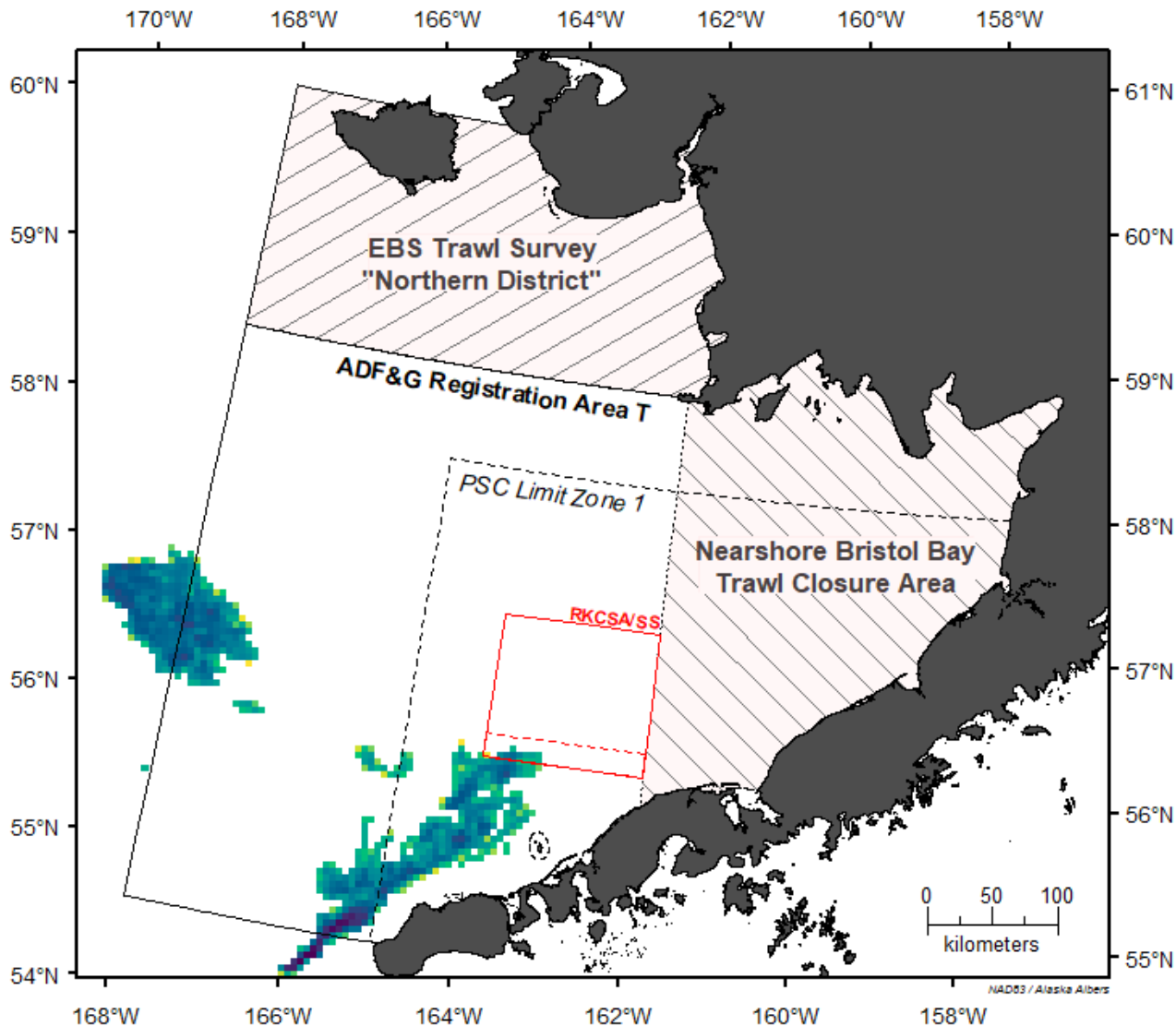
SA, km²



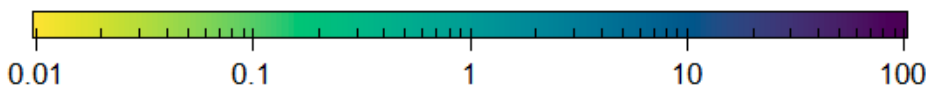
June 2011: Total Swept Area (SA), by PTR (3,304 km²)



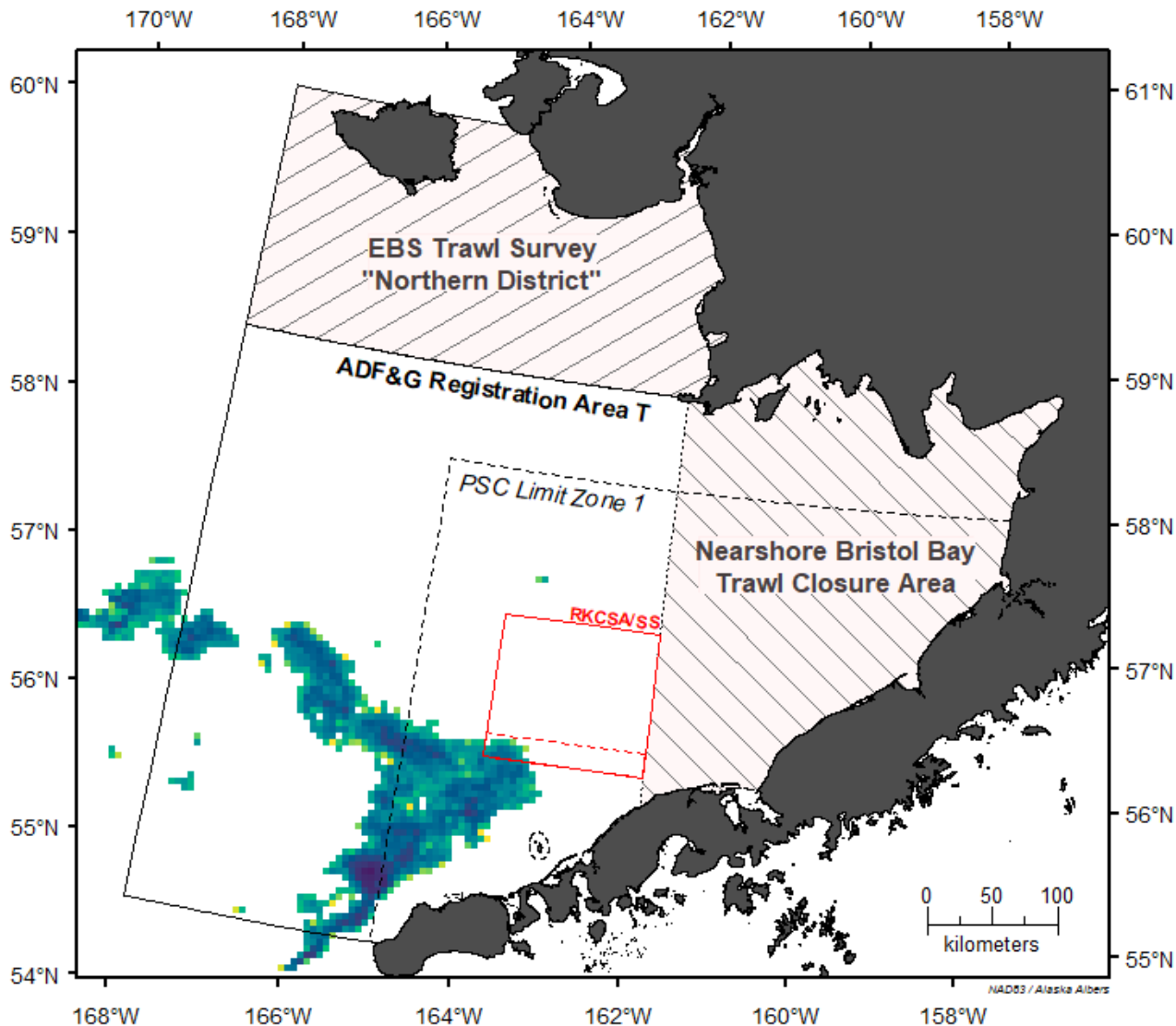
July 2011: Total Swept Area (SA), by PTR (3,046.9 km²)



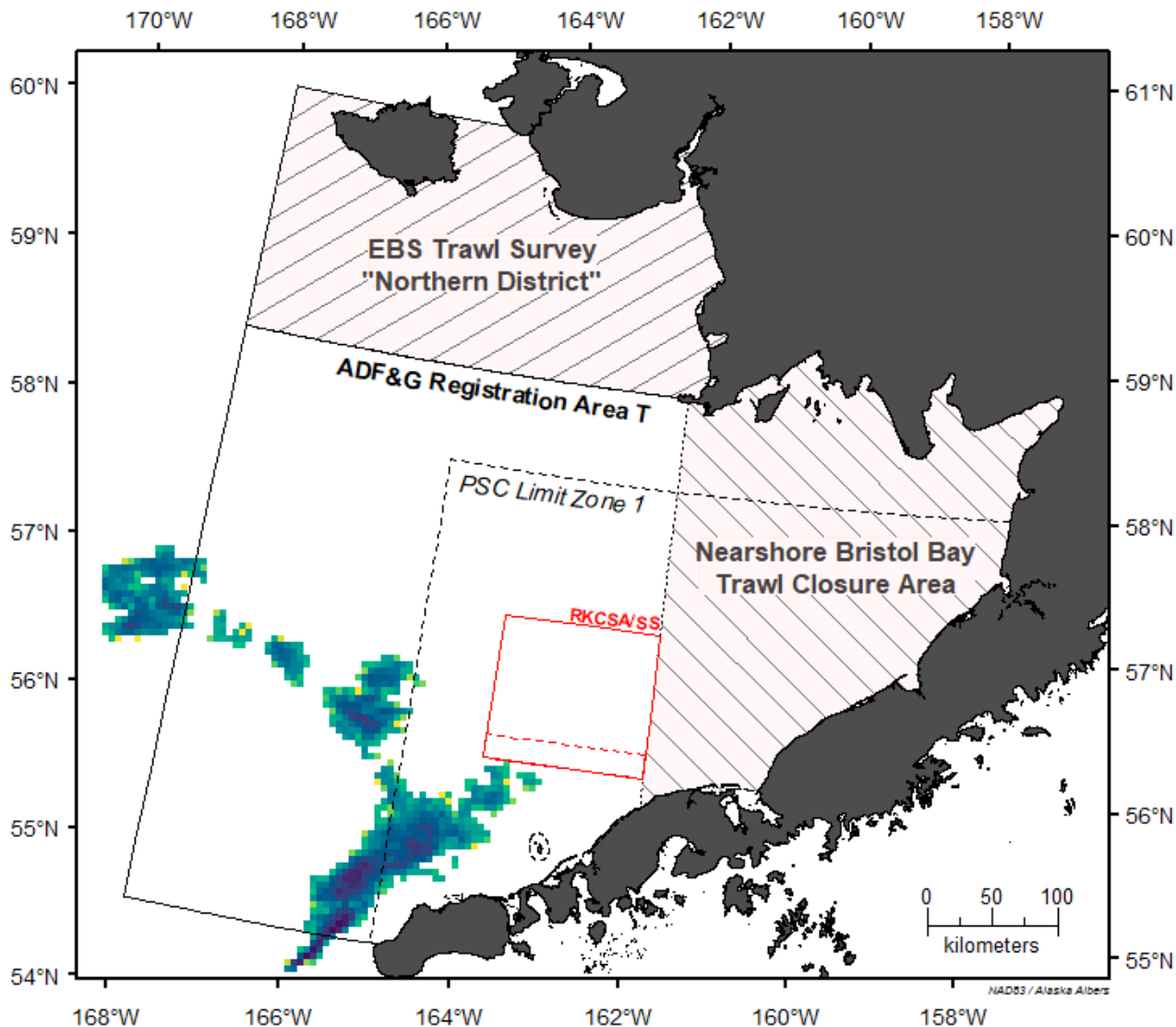
SA, km²



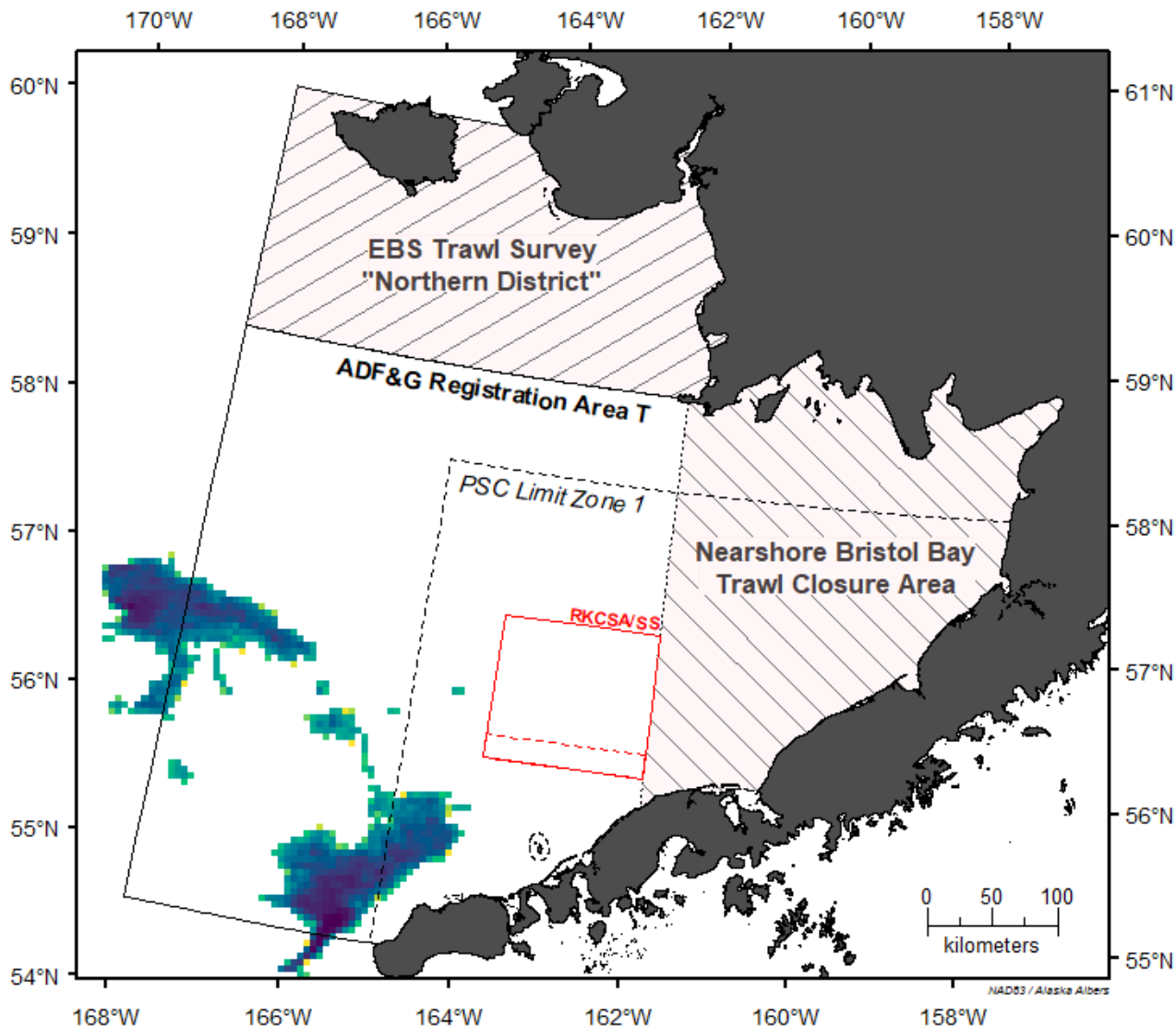
August 2011: Total Swept Area (SA), by PTR (6,172.9 km²)



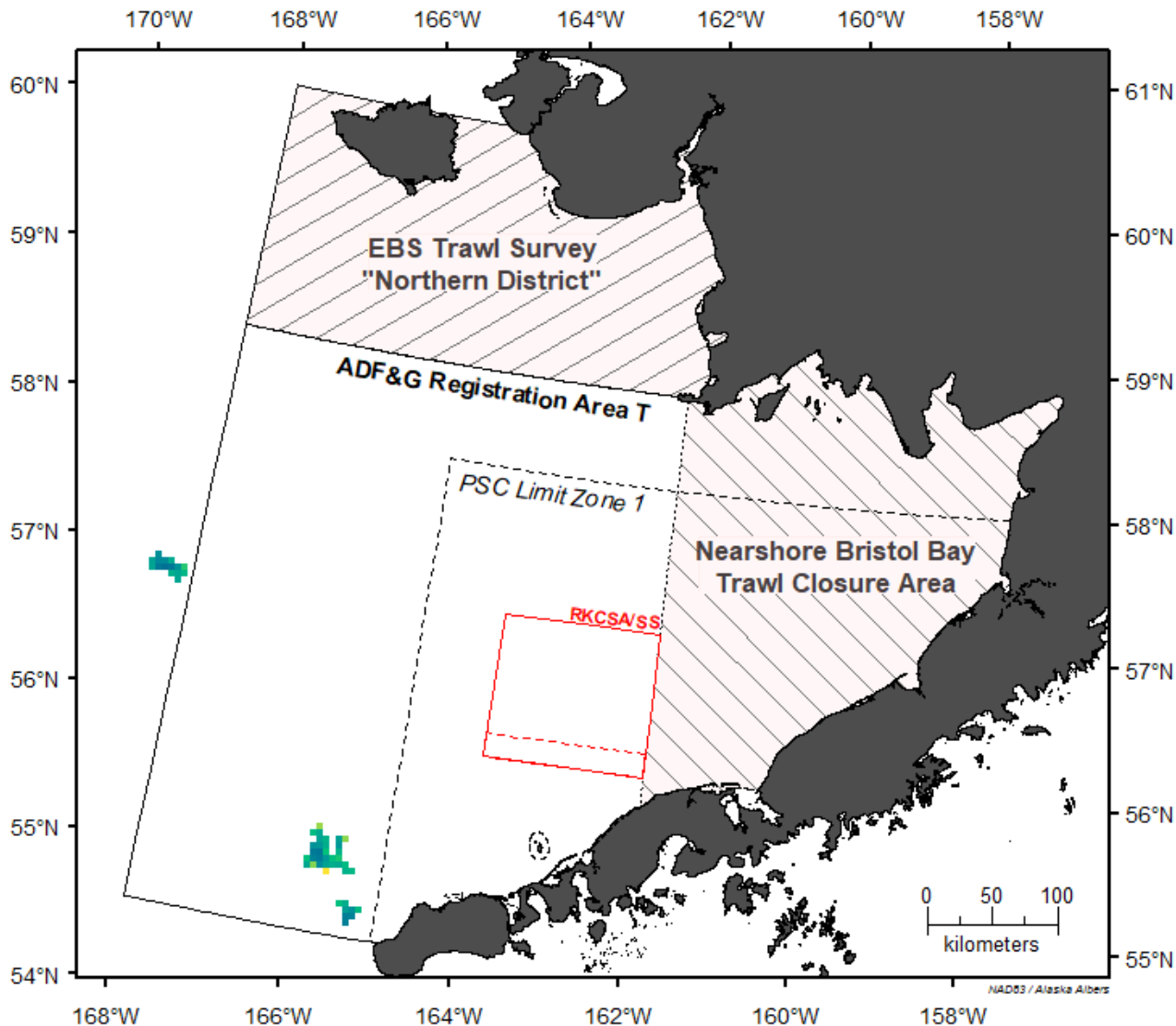
September 2011: Total Swept Area (SA), by PTR (4,233.8 km²)



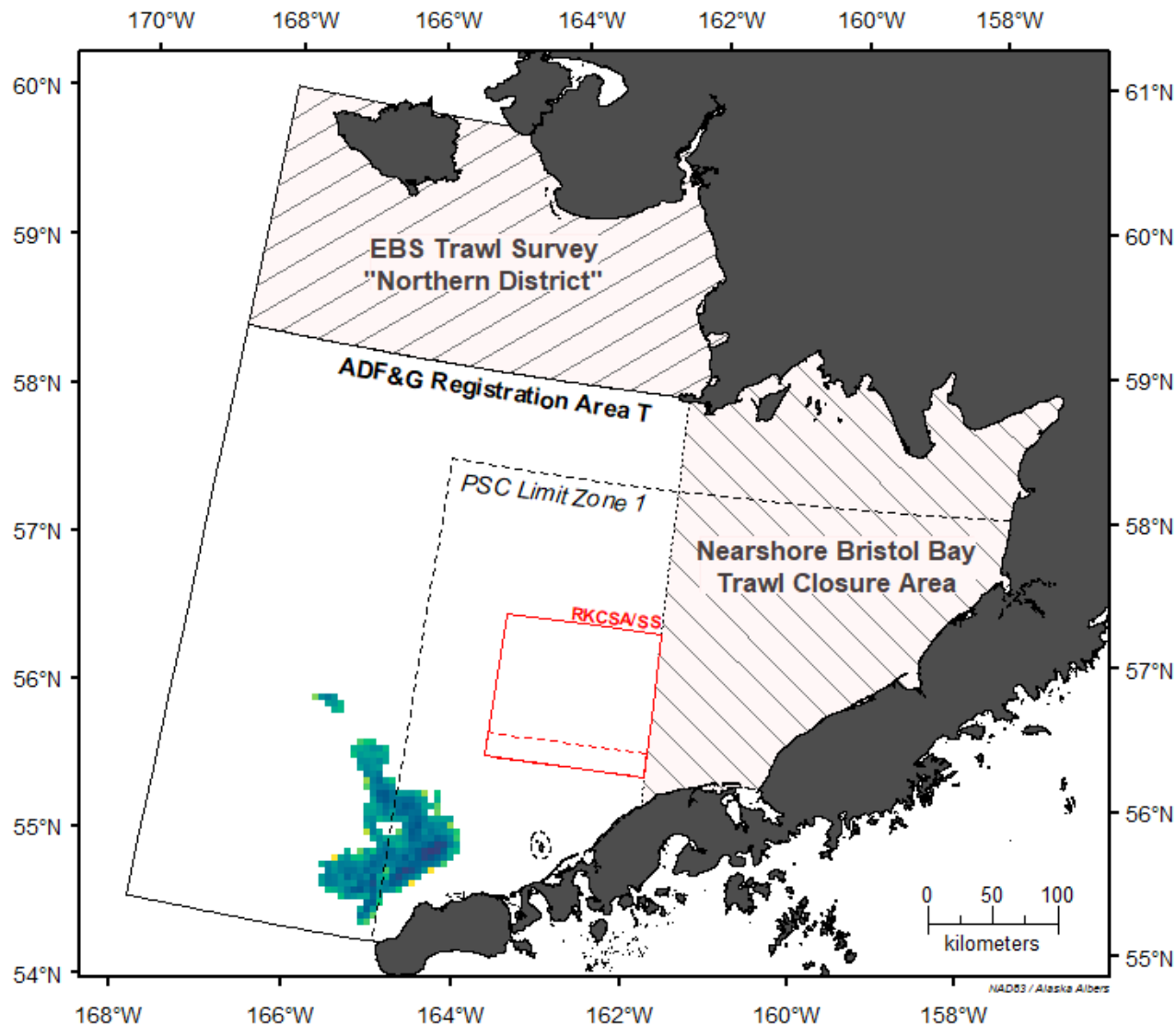
October 2011: Total Swept Area (SA), by PTR (8,469.8 km²)



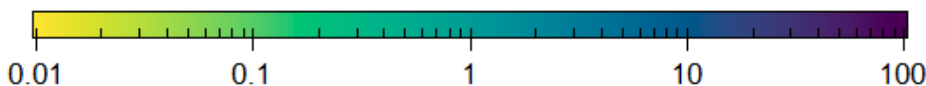
November 2011: Total Swept Area (SA), by PTR (39.4 km²)



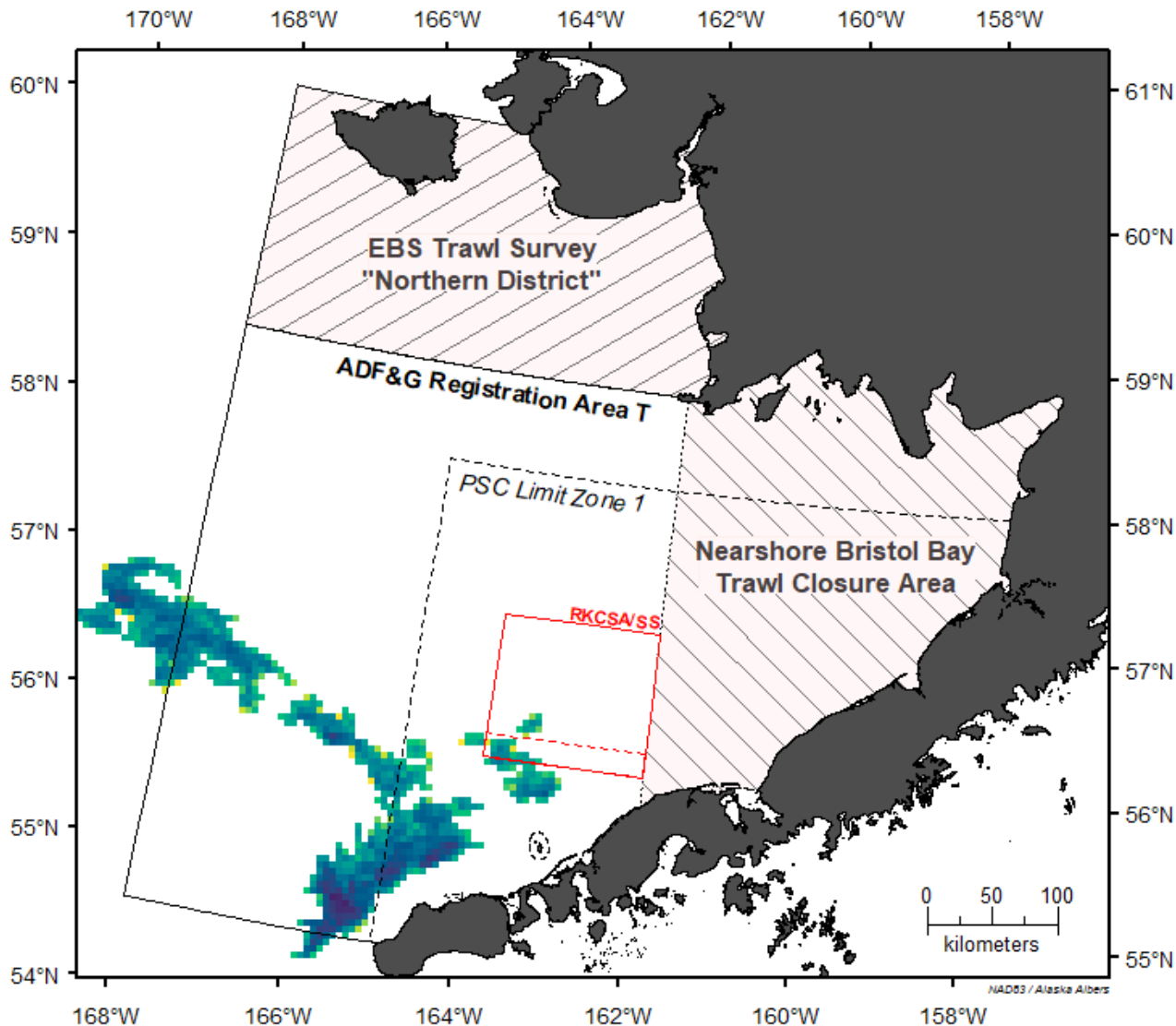
January 2012: Total Swept Area (SA), by PTR (1,564.4 km²)



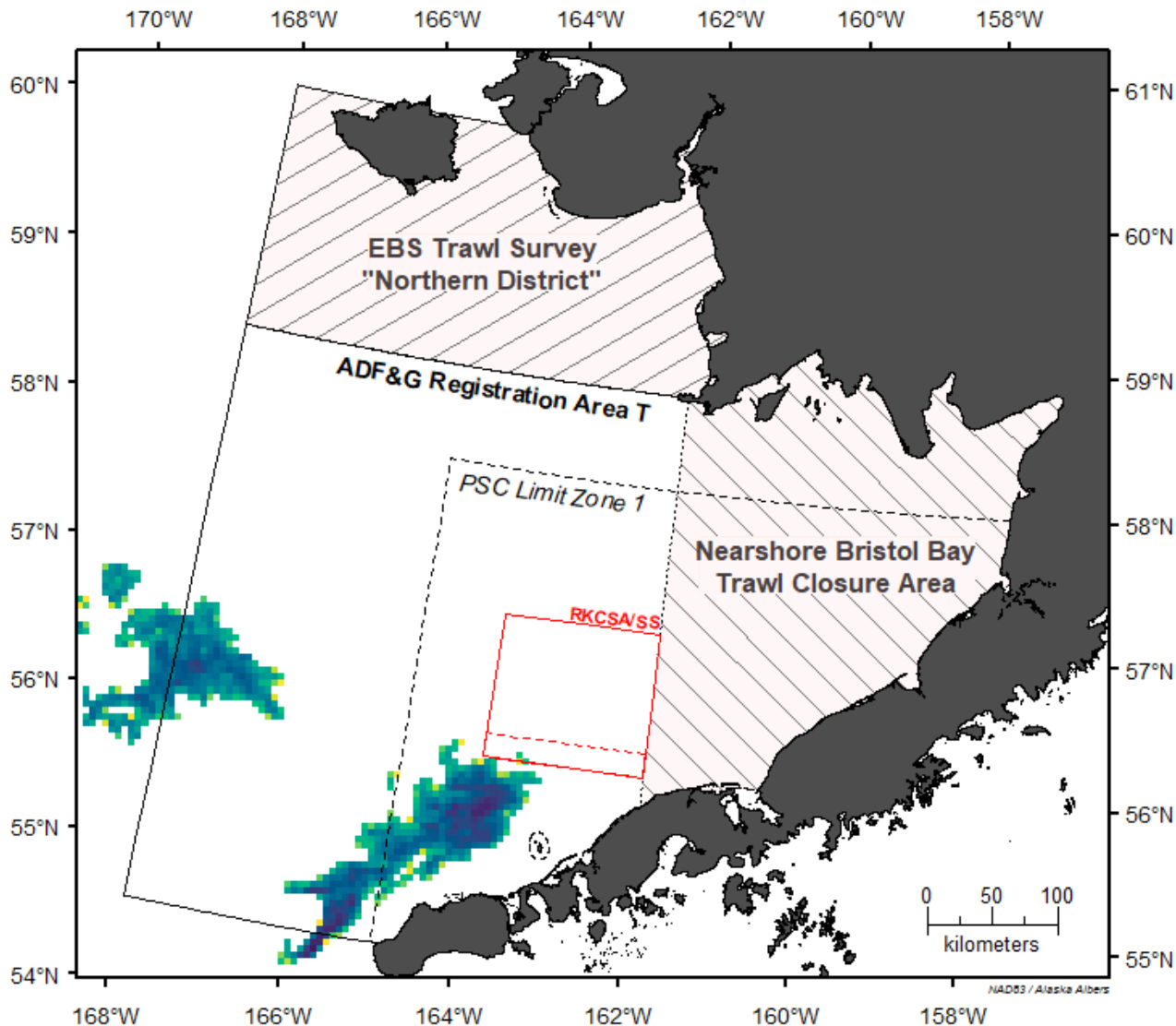
SA, km²



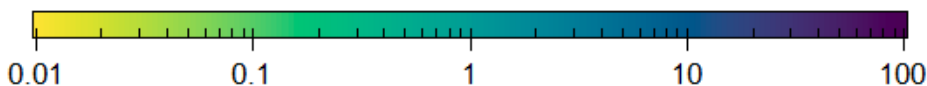
February 2012: Total Swept Area (SA), by PTR (4,033.2 km²)



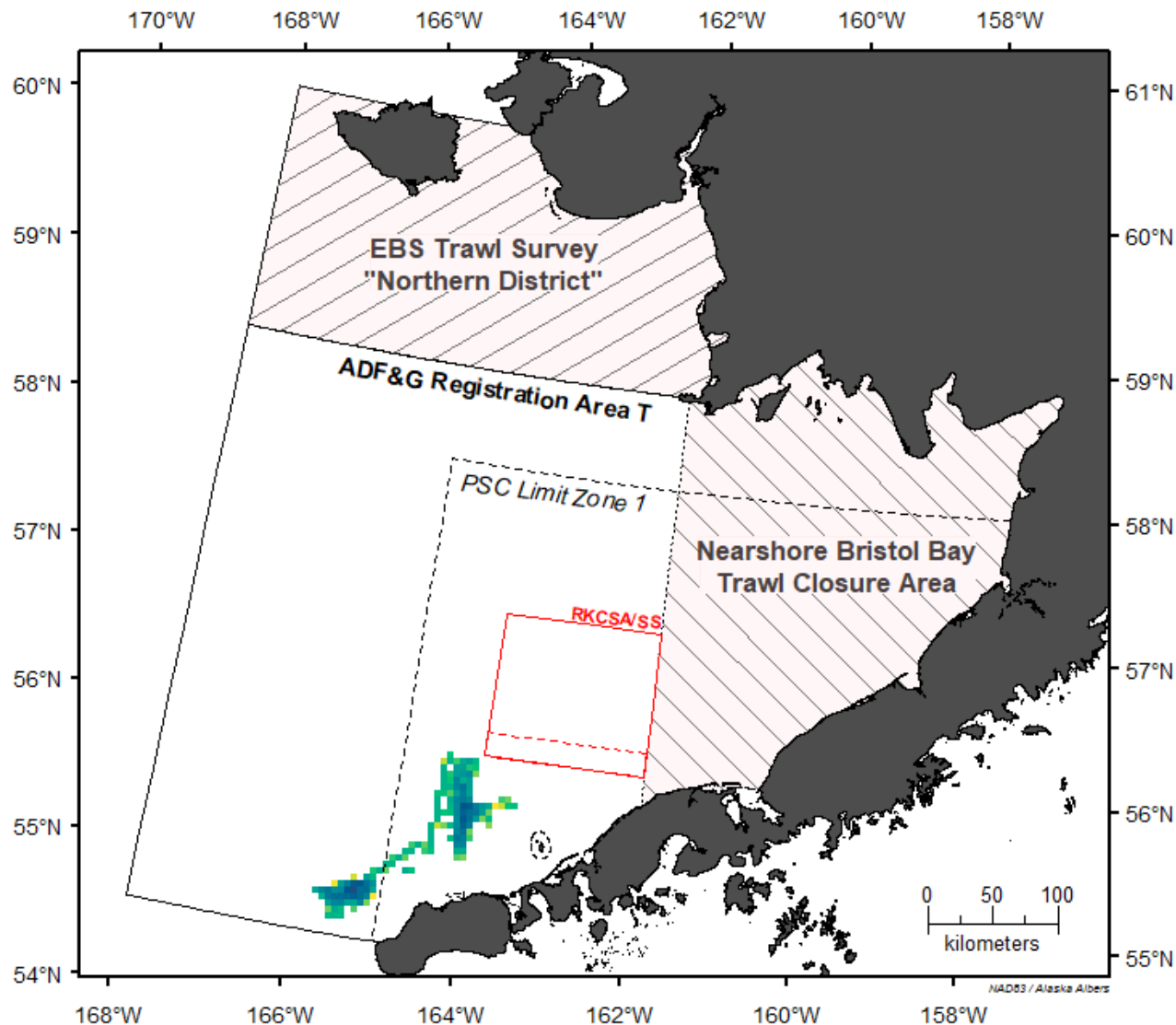
March 2012: Total Swept Area (SA), by PTR (5,675.3 km²)



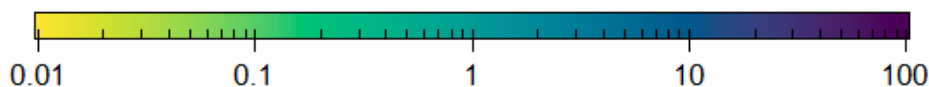
SA, km²



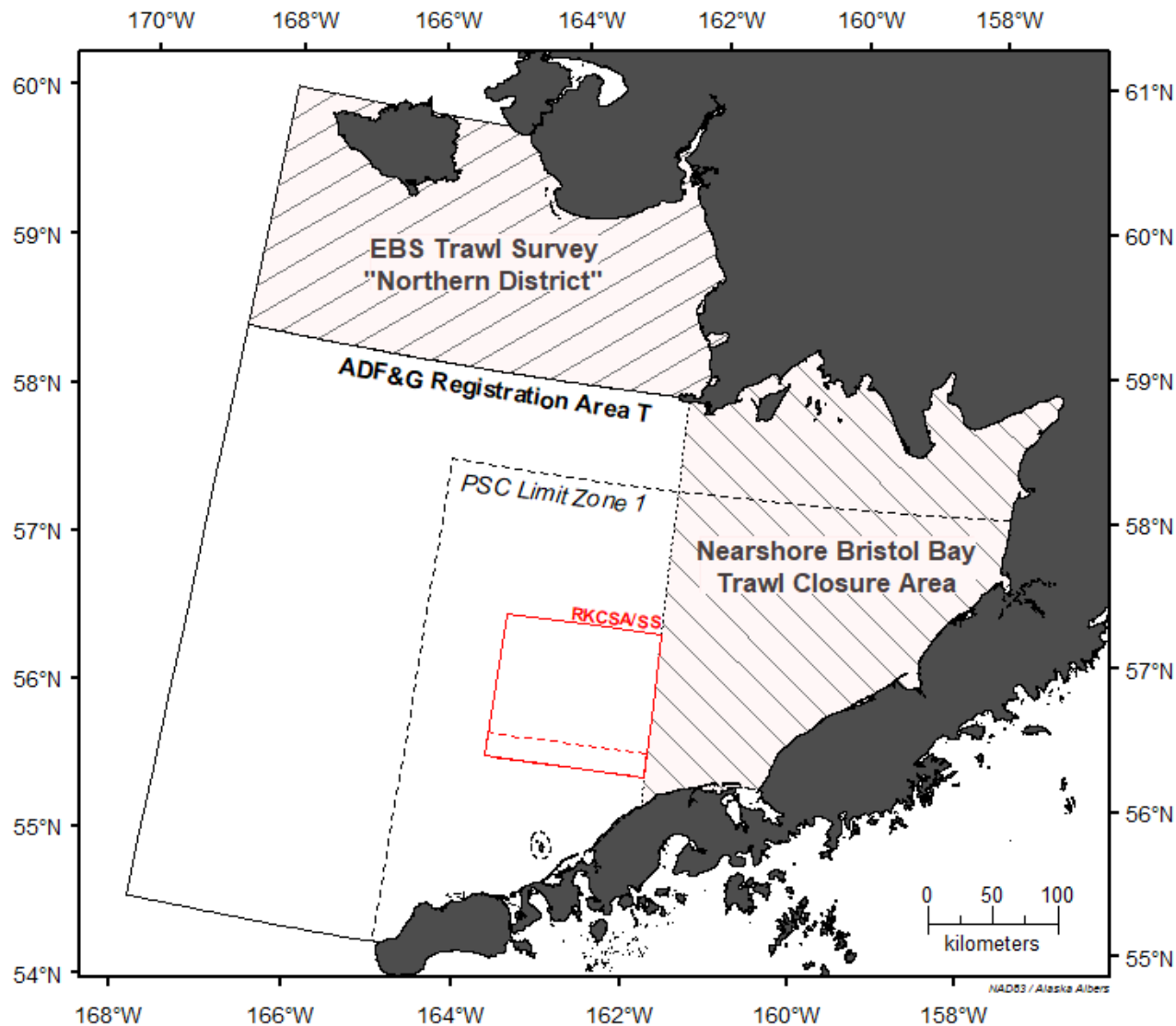
April 2012: Total Swept Area (SA), by PTR (405.2 km²)



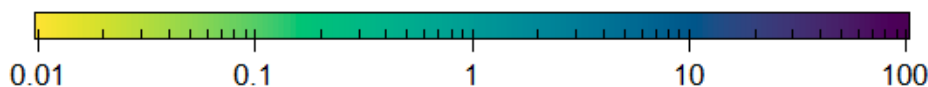
SA, km²



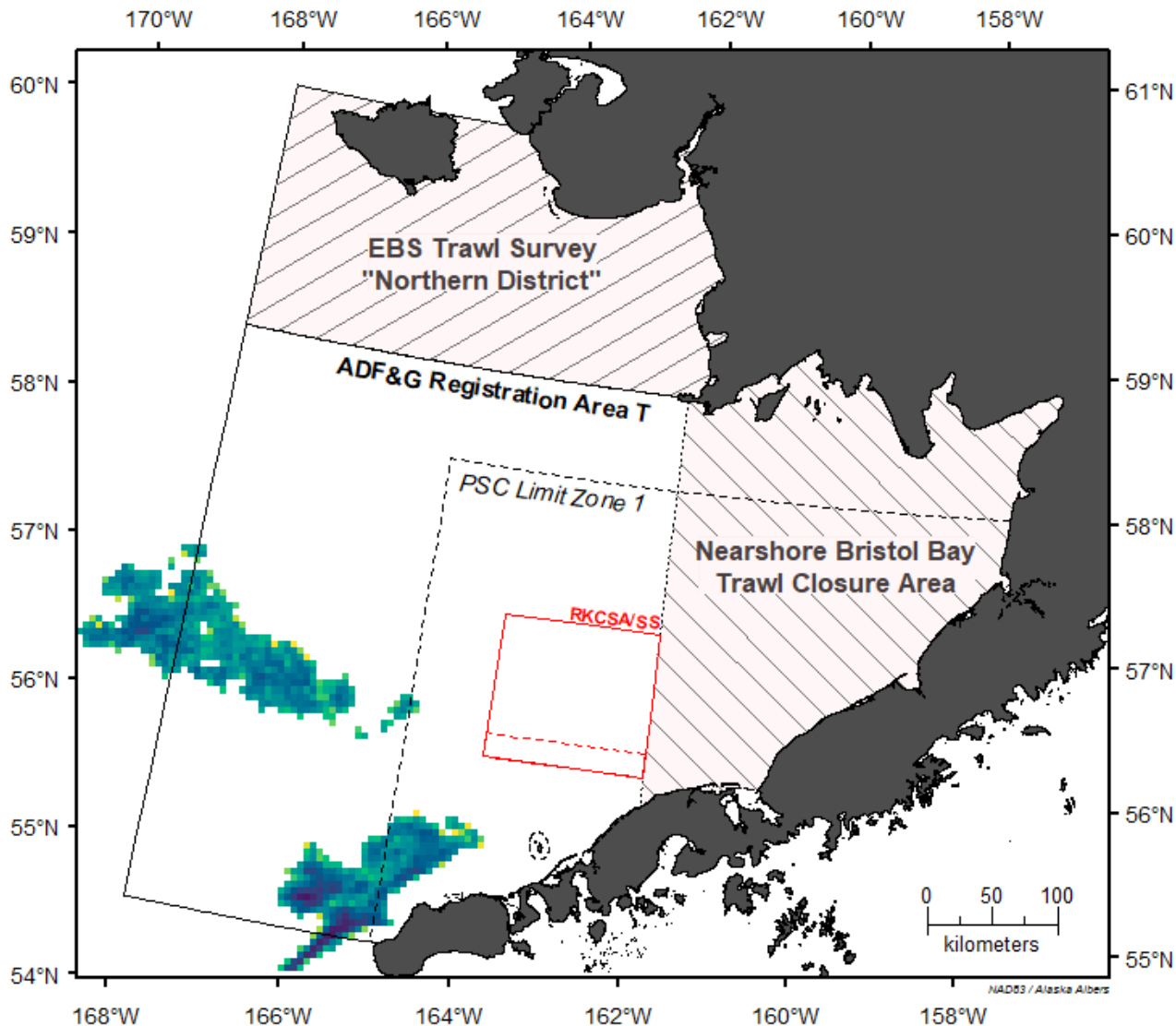
May 2012: Total Swept Area (SA), by PTR (0 km²)



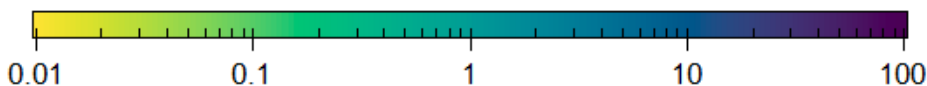
SA, km²



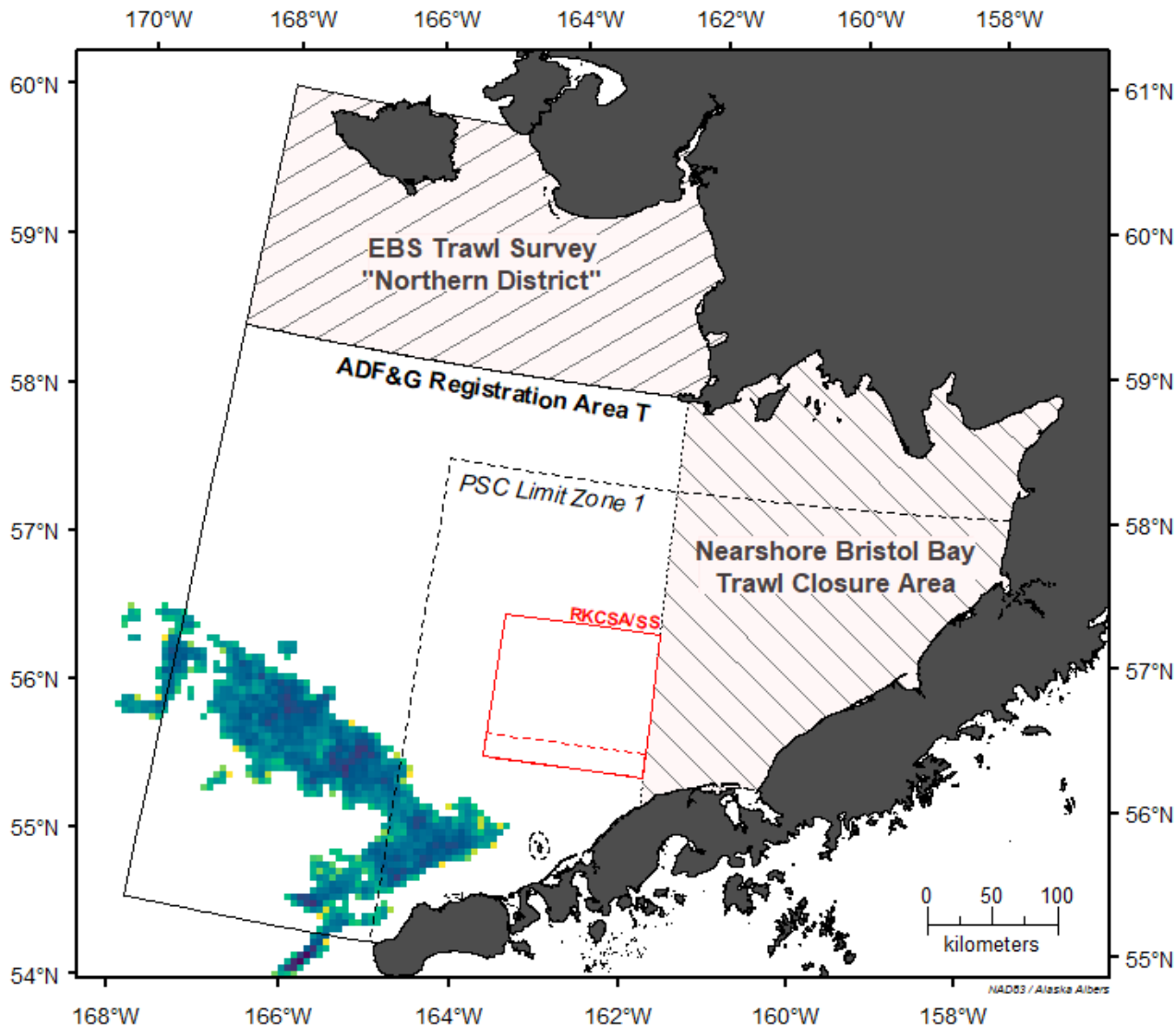
June 2012: Total Swept Area (SA), by PTR (3,150.4 km²)



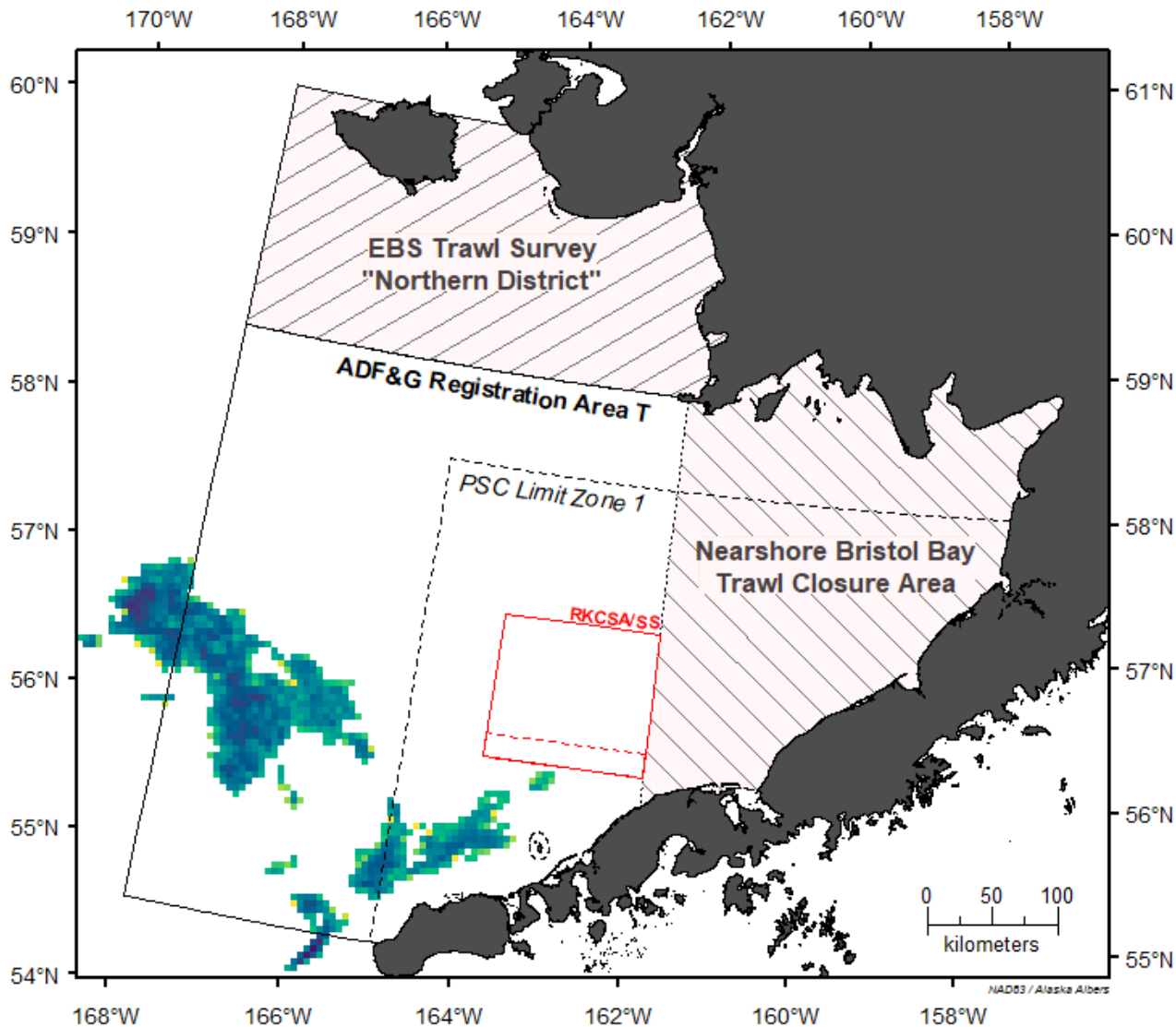
SA, km²



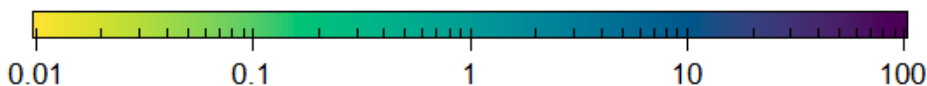
July 2012: Total Swept Area (SA), by PTR (4,504.3 km²)



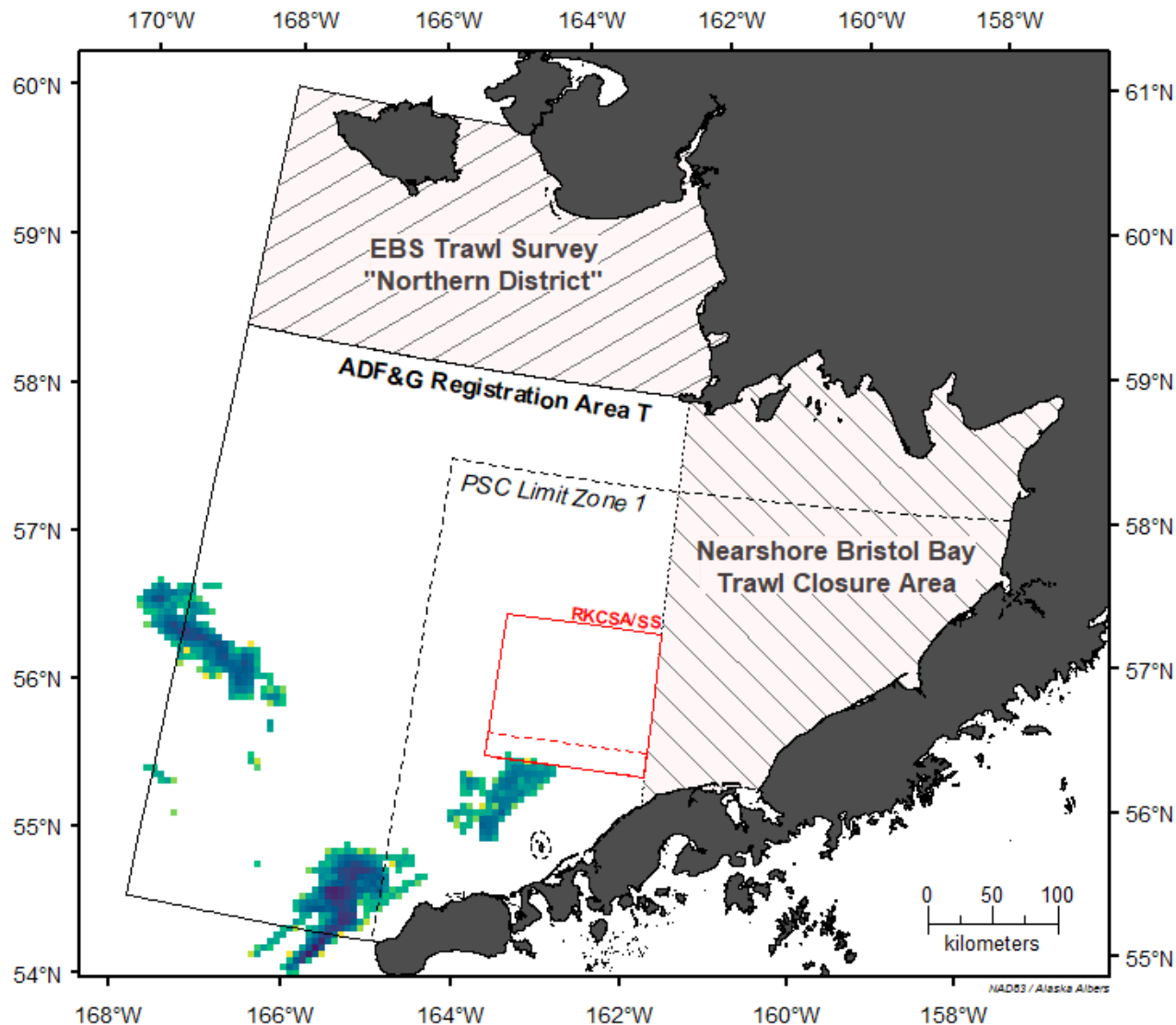
August 2012: Total Swept Area (SA), by PTR (2,767.7 km²)



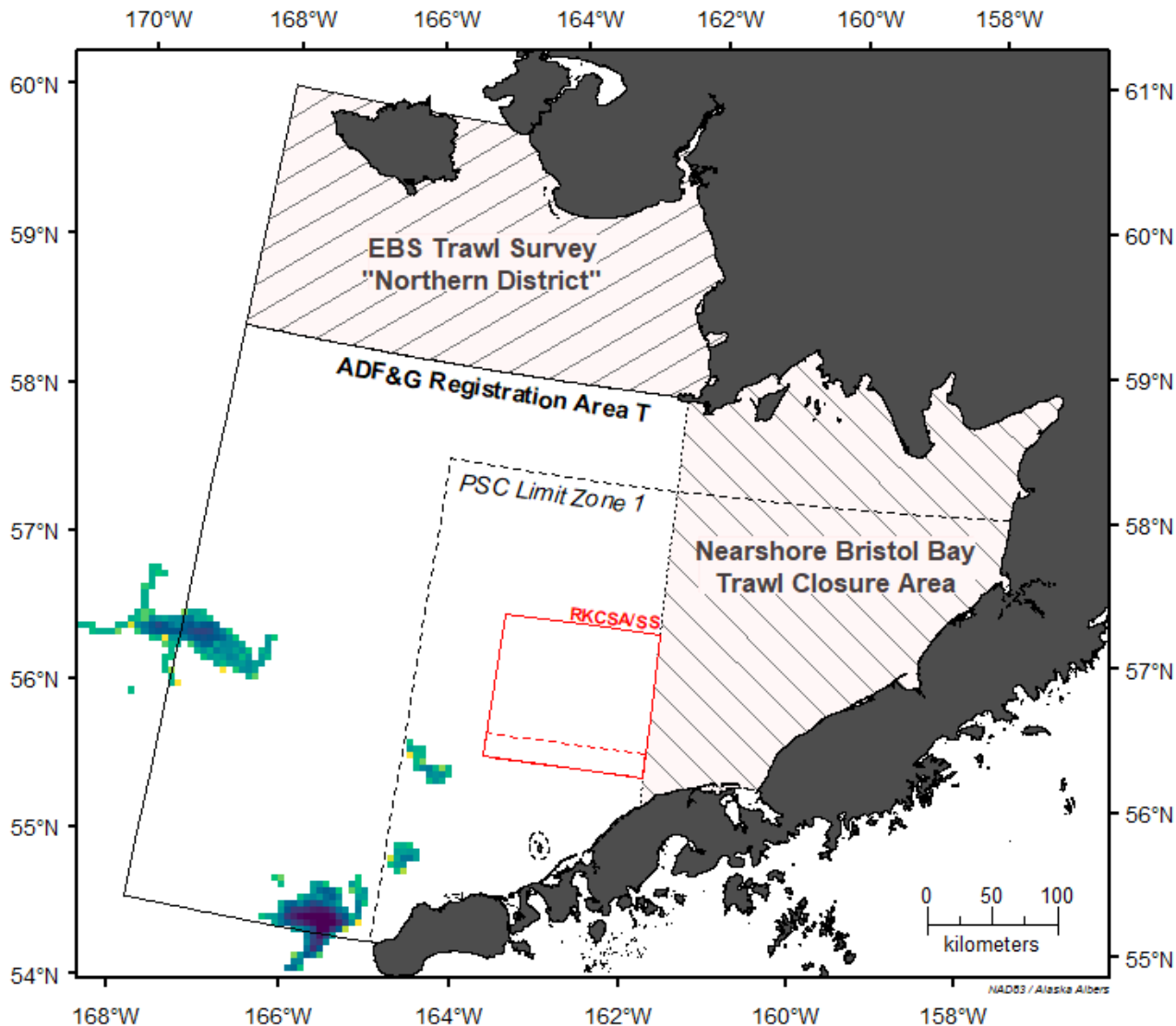
SA, km²



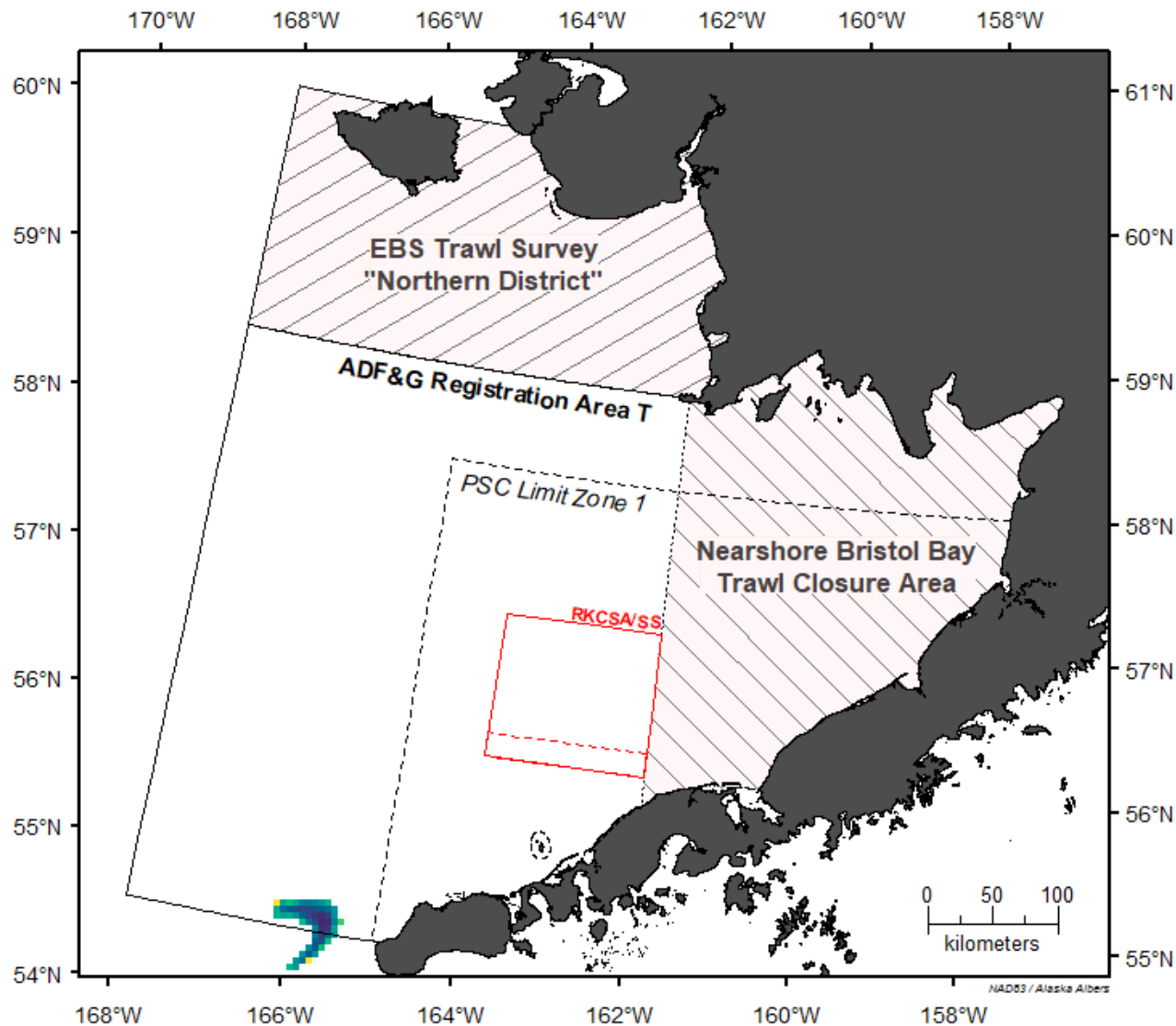
September 2012: Total Swept Area (SA), by PTR (2,222.3 km²)



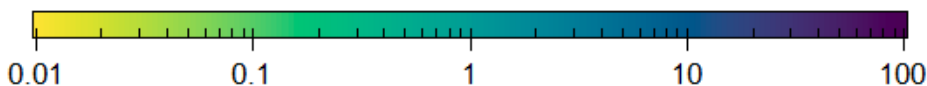
October 2012: Total Swept Area (SA), by PTR (2,582.8 km²)



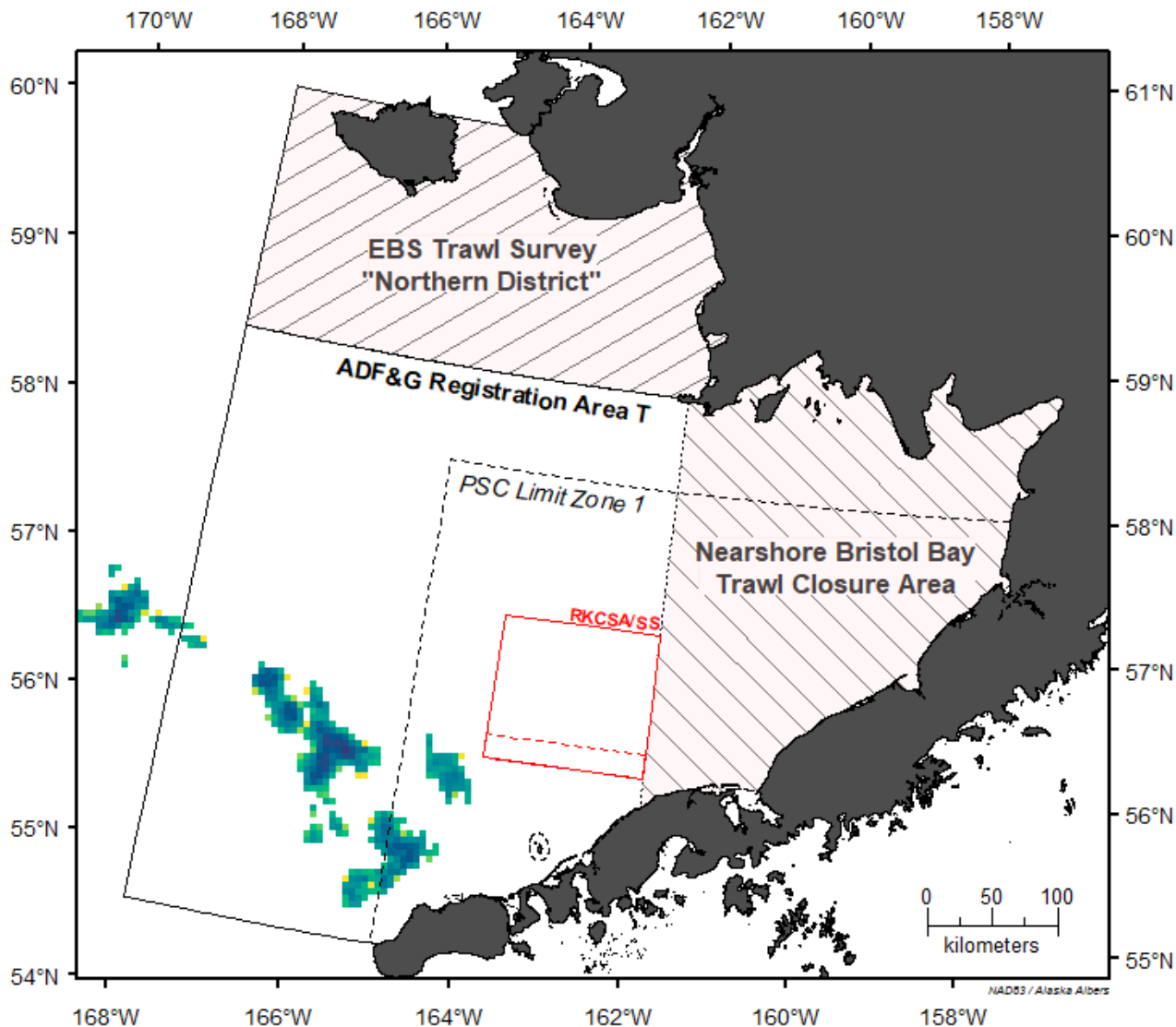
November 2012: Total Swept Area (SA), by PTR (417.5 km²)



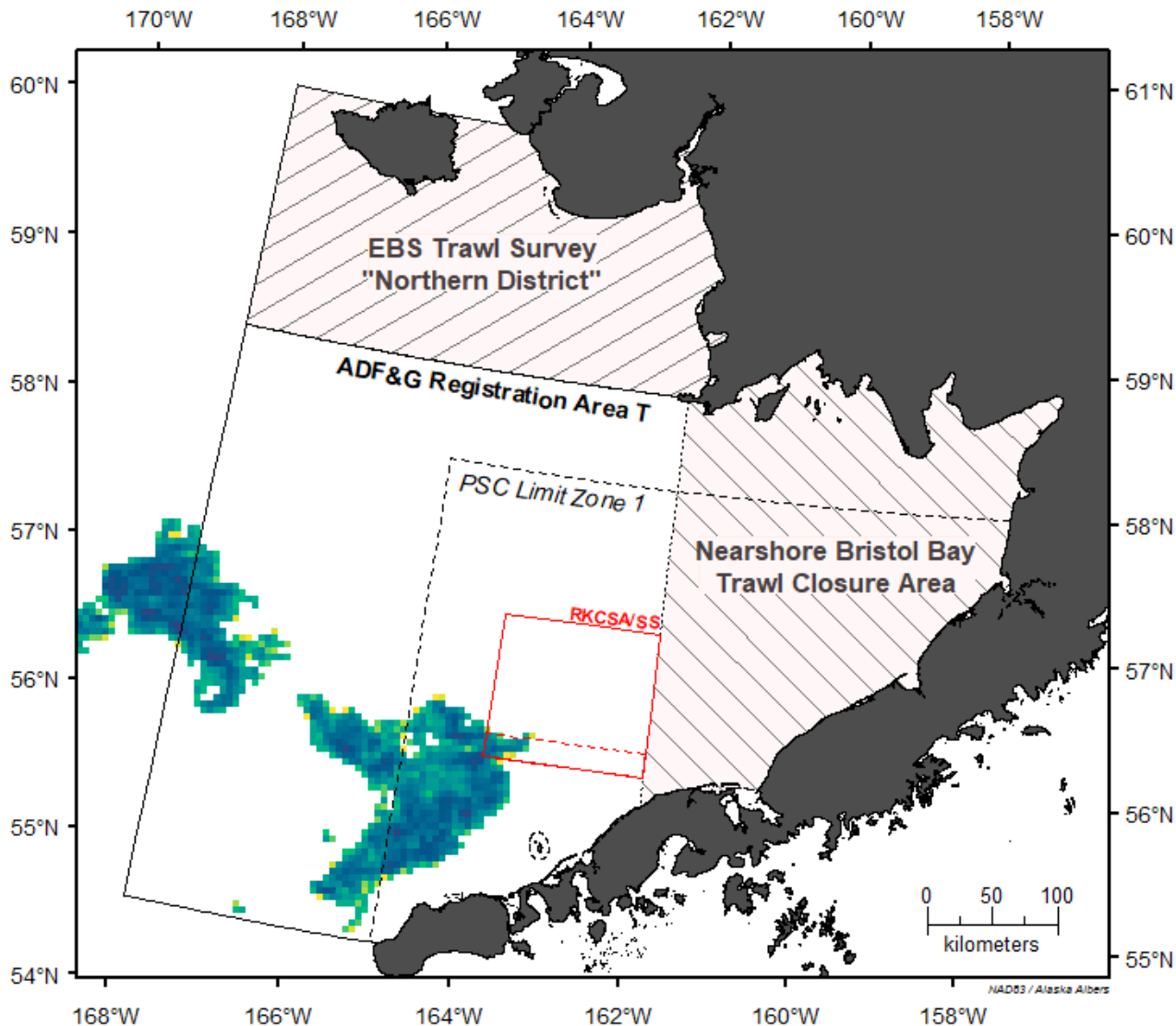
SA, km²



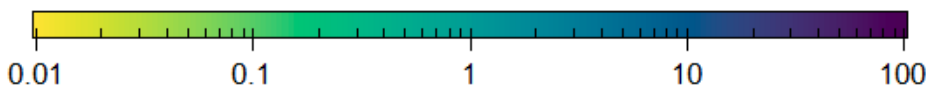
January 2013: Total Swept Area (SA), by PTR (1,207.3 km²)



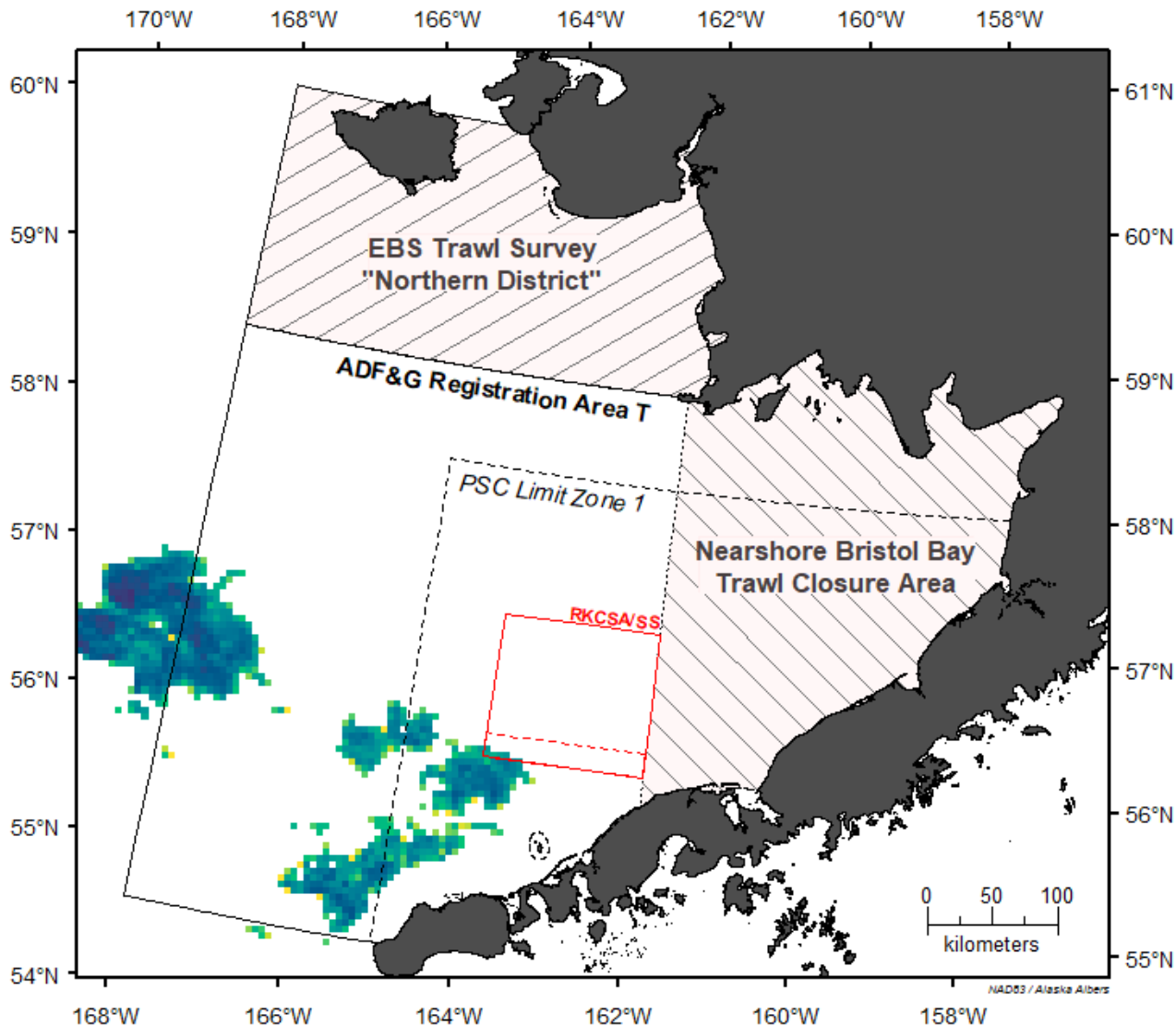
February 2013: Total Swept Area (SA), by PTR (4,634 km²)



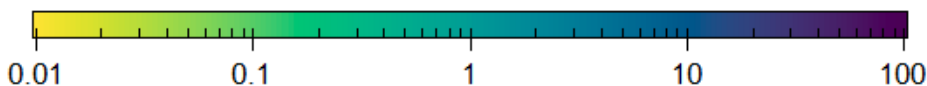
SA, km²



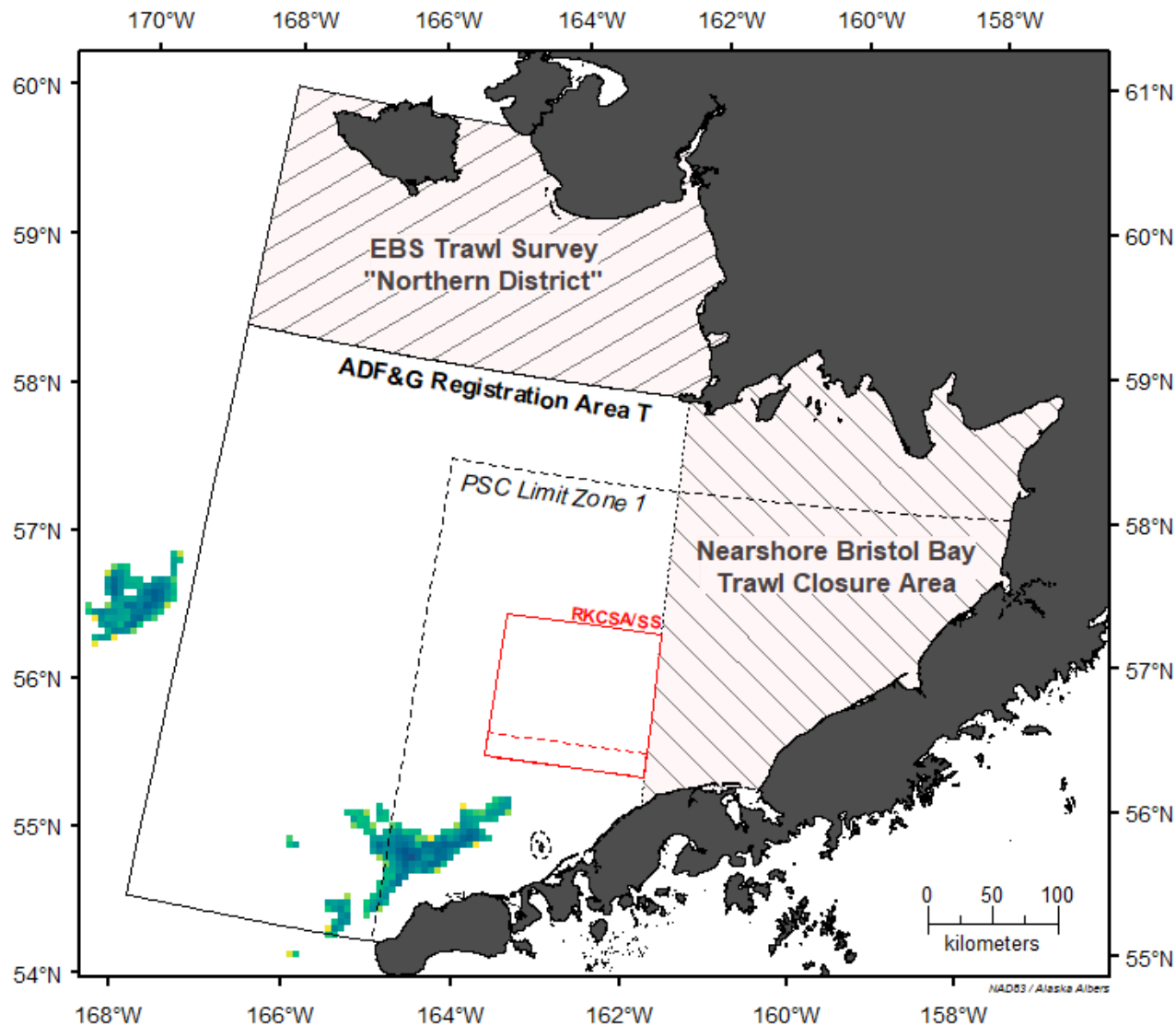
March 2013: Total Swept Area (SA), by PTR (2,364.6 km²)



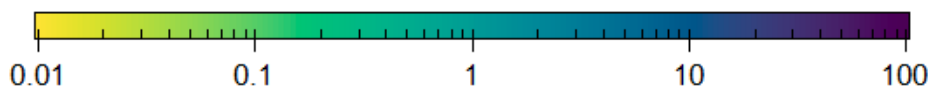
SA, km²



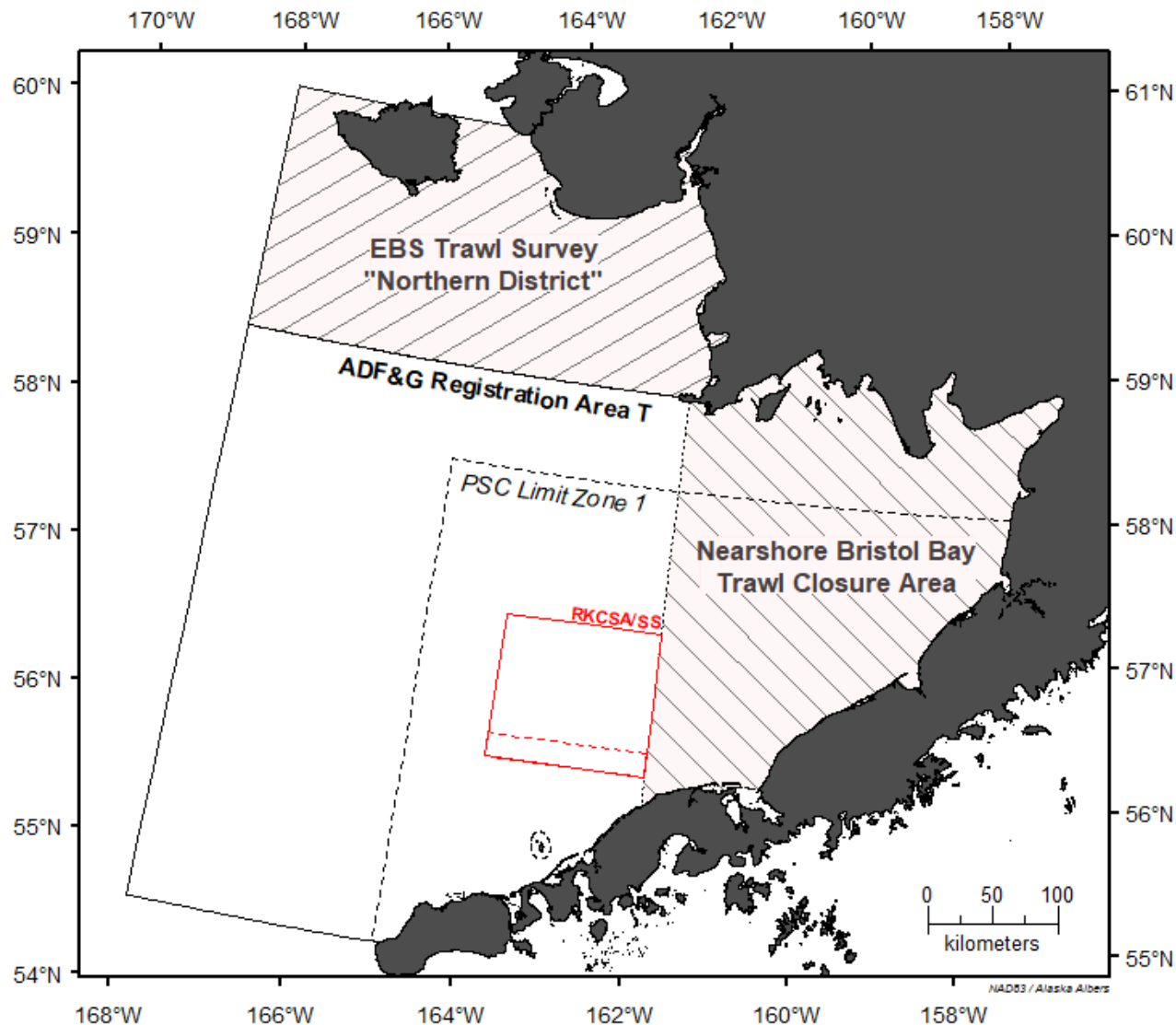
April 2013: Total Swept Area (SA), by PTR (641.6 km²)



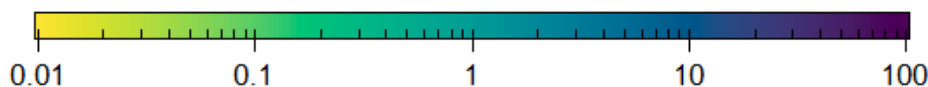
SA, km²



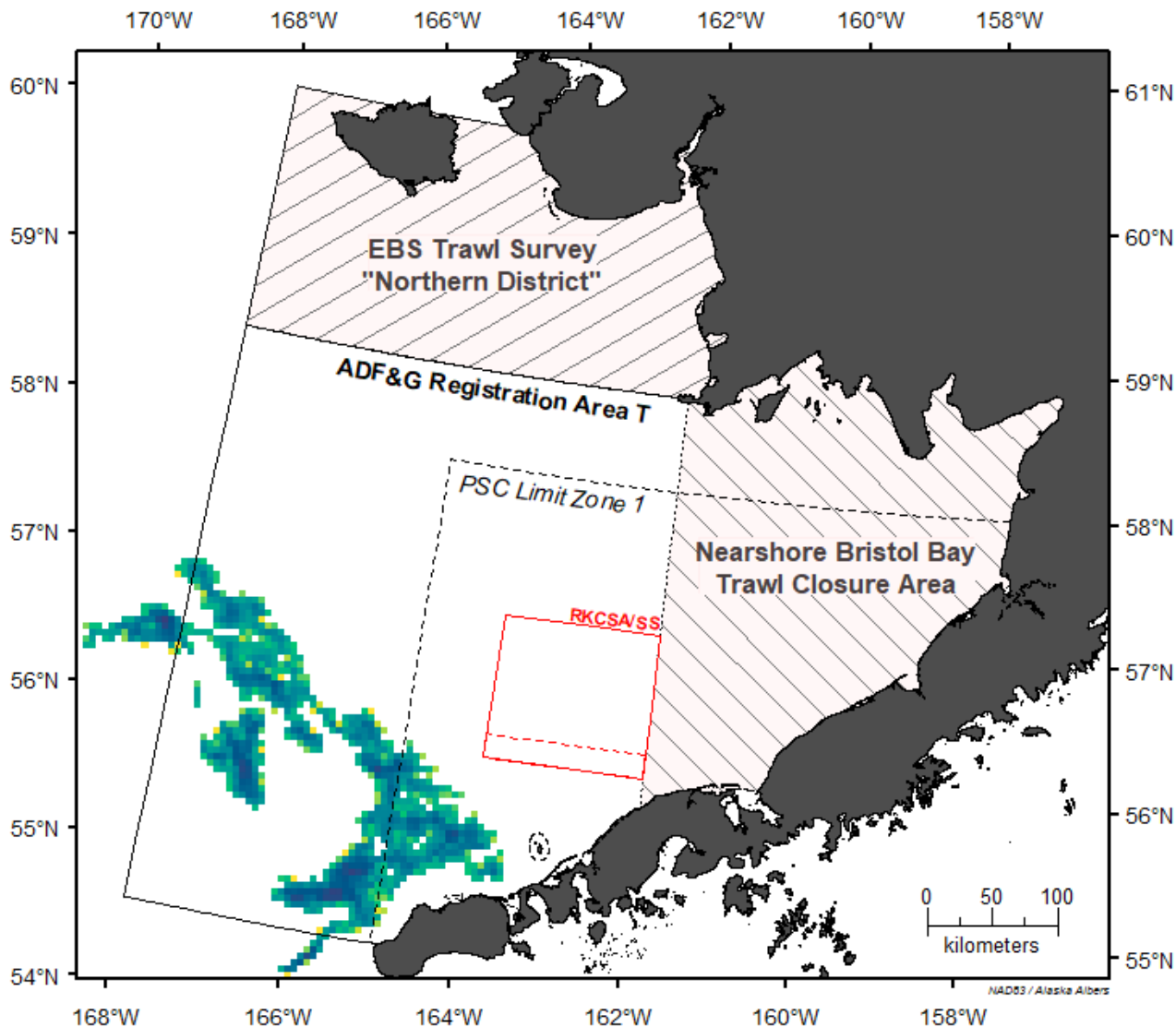
May 2013: Total Swept Area (SA), by PTR (0 km²)



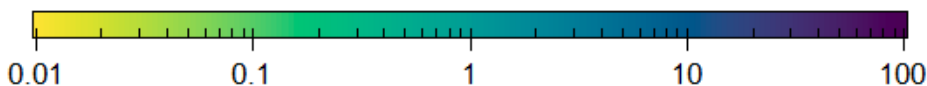
SA, km²



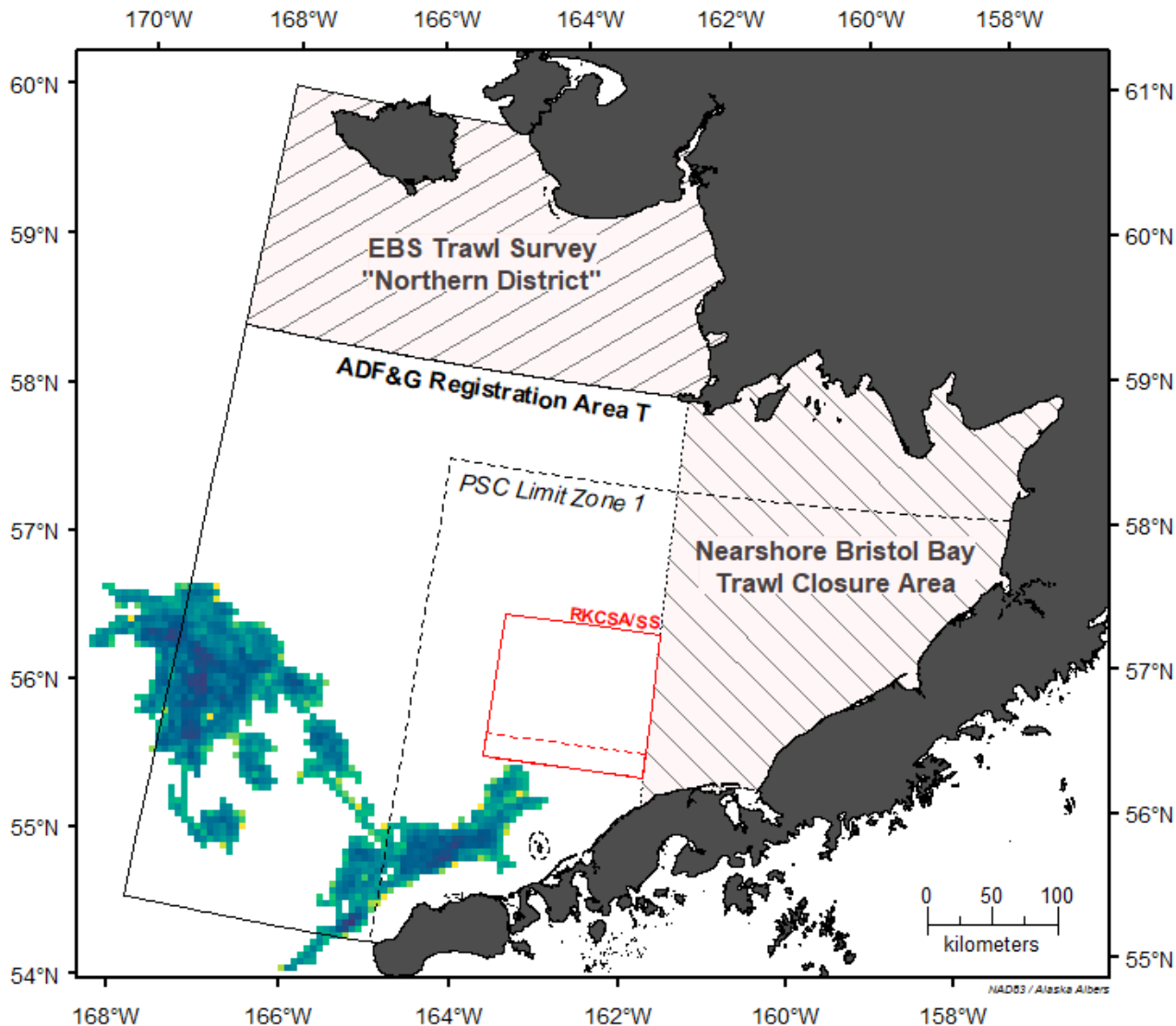
June 2013: Total Swept Area (SA), by PTR (2,540.9 km²)



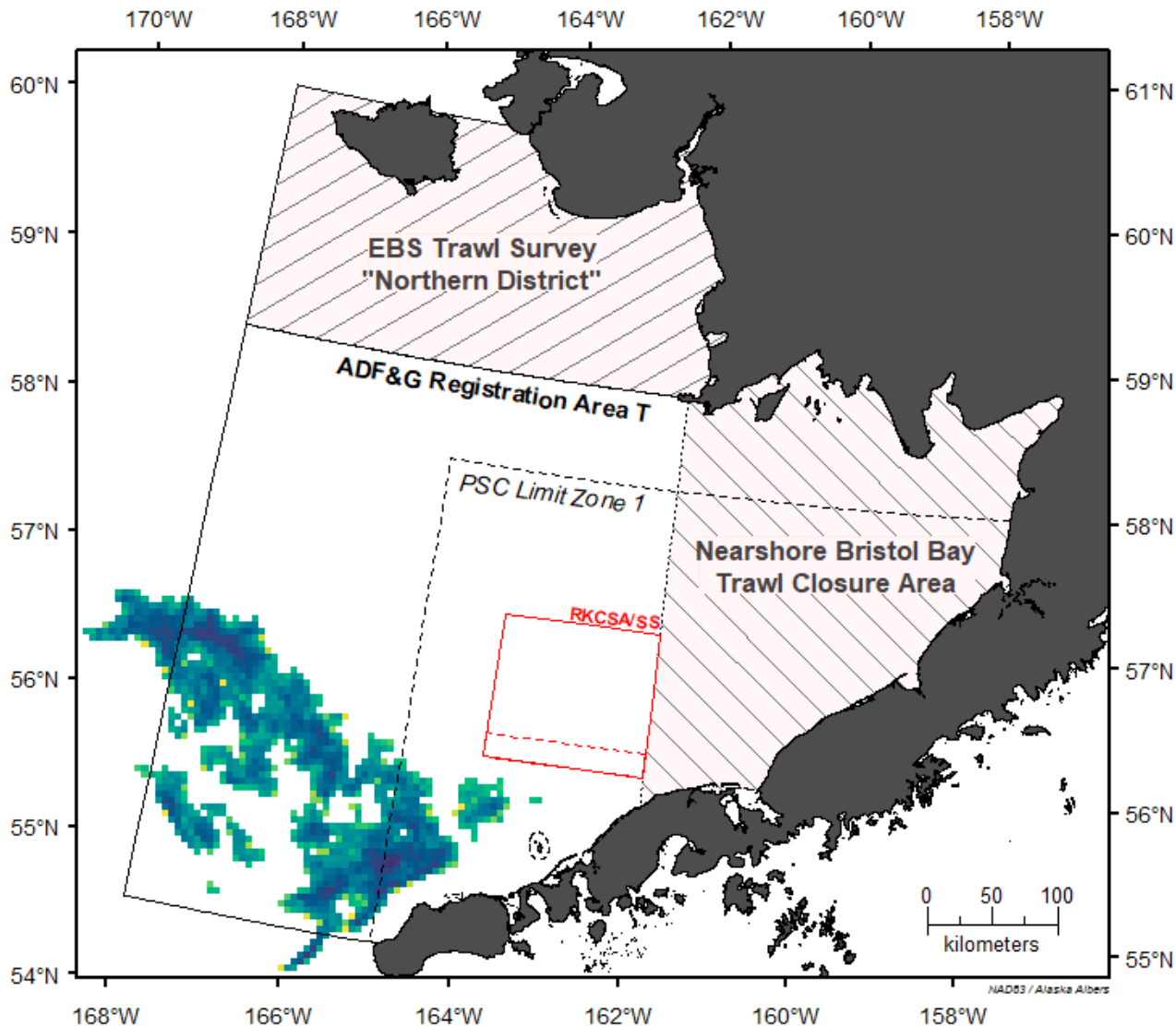
SA, km²



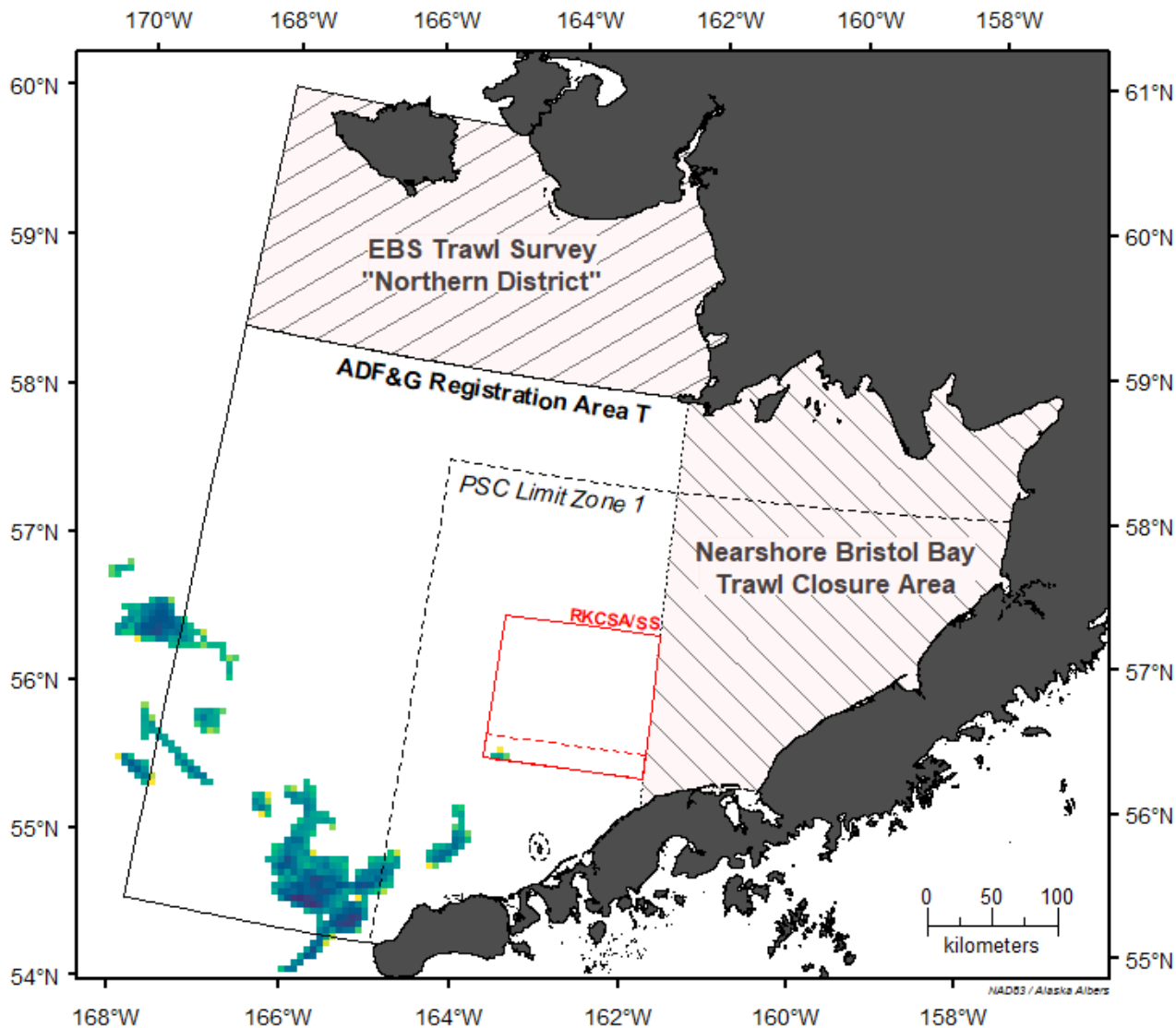
July 2013: Total Swept Area (SA), by PTR (4,074.8 km²)



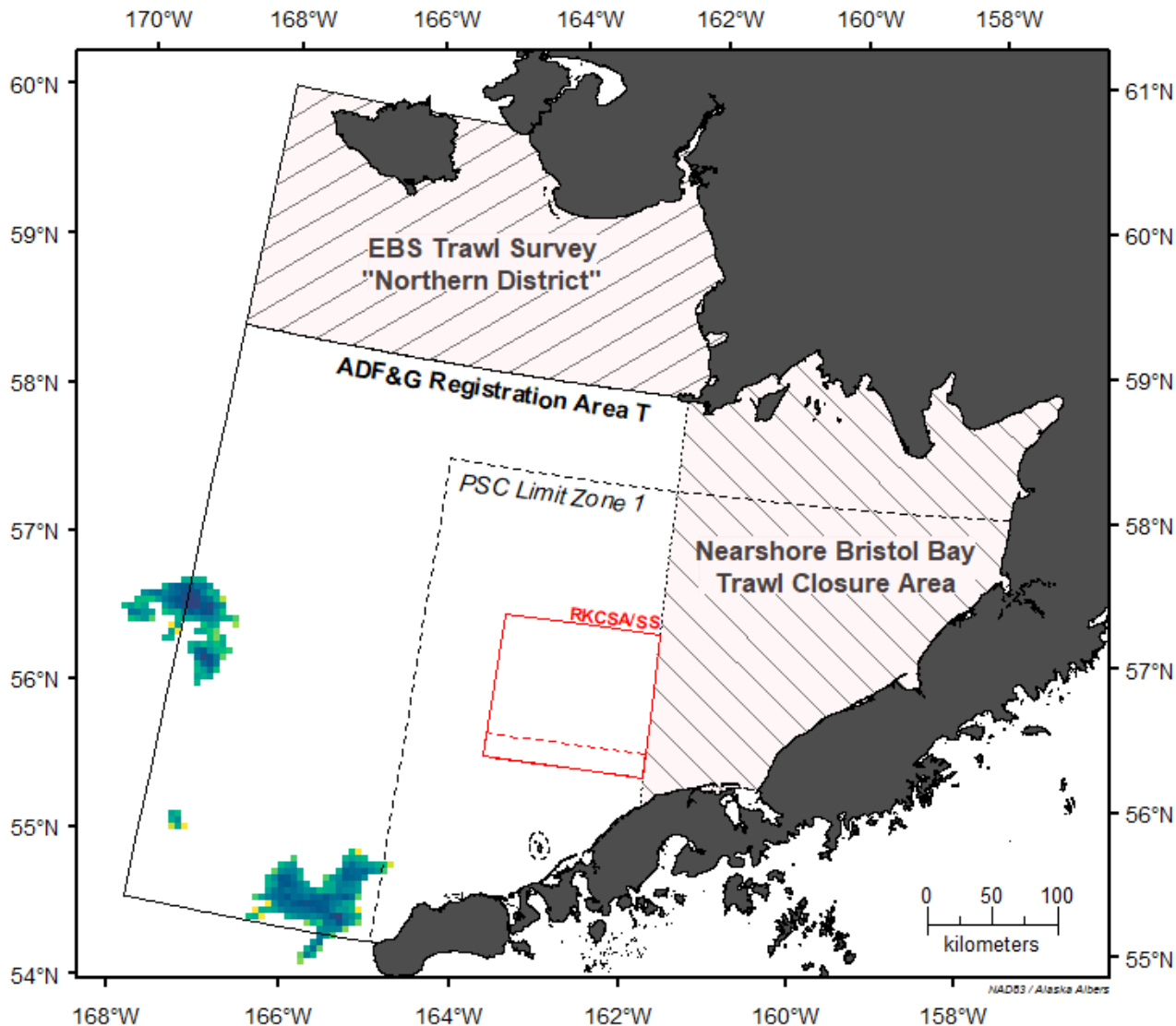
August 2013: Total Swept Area (SA), by PTR (5,653.2 km²)



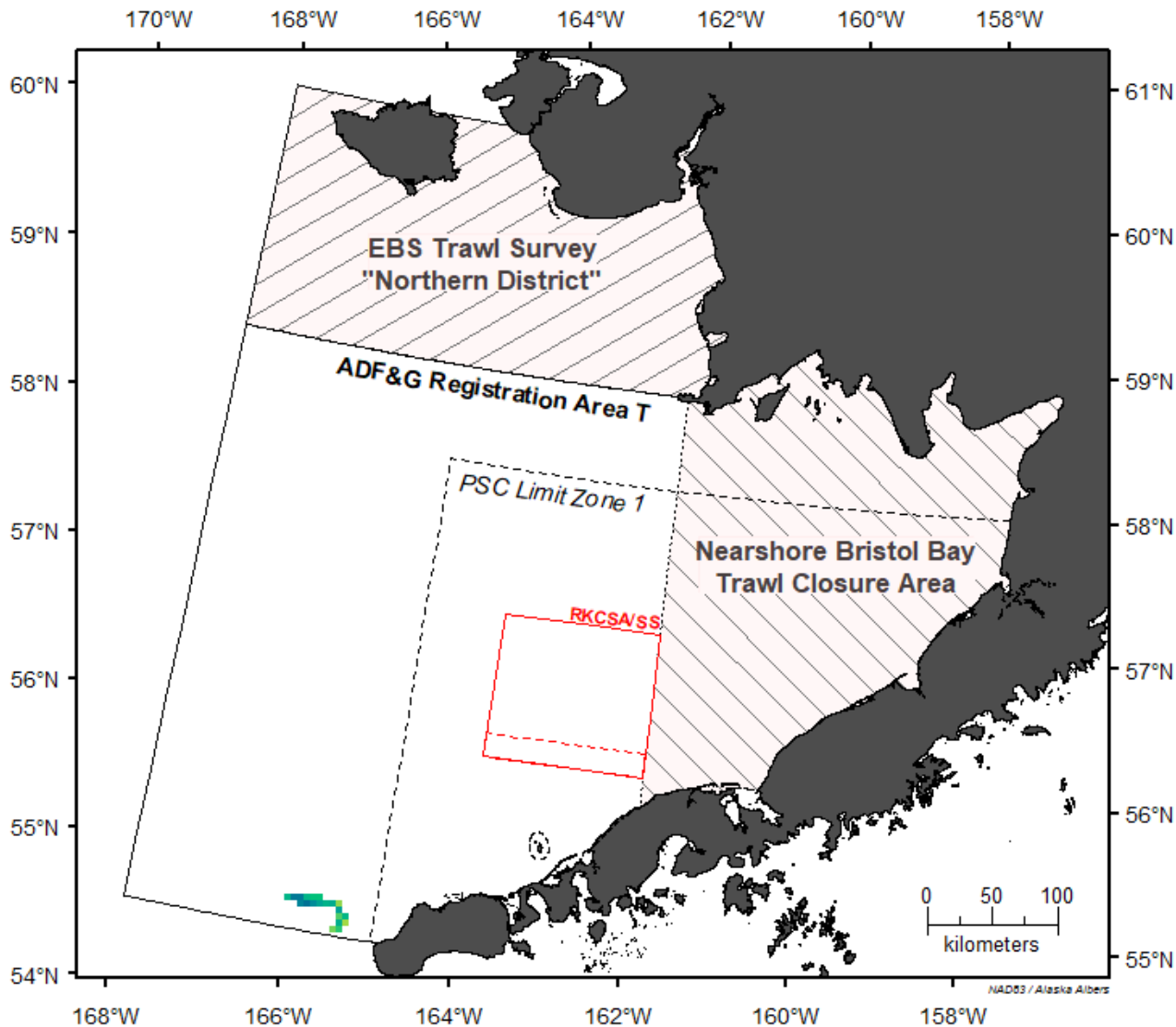
September 2013: Total Swept Area (SA), by PTR (1,180.3 km²)



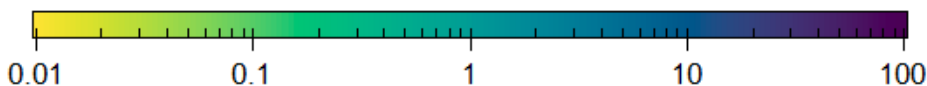
October 2013: Total Swept Area (SA), by PTR (849.5 km²)



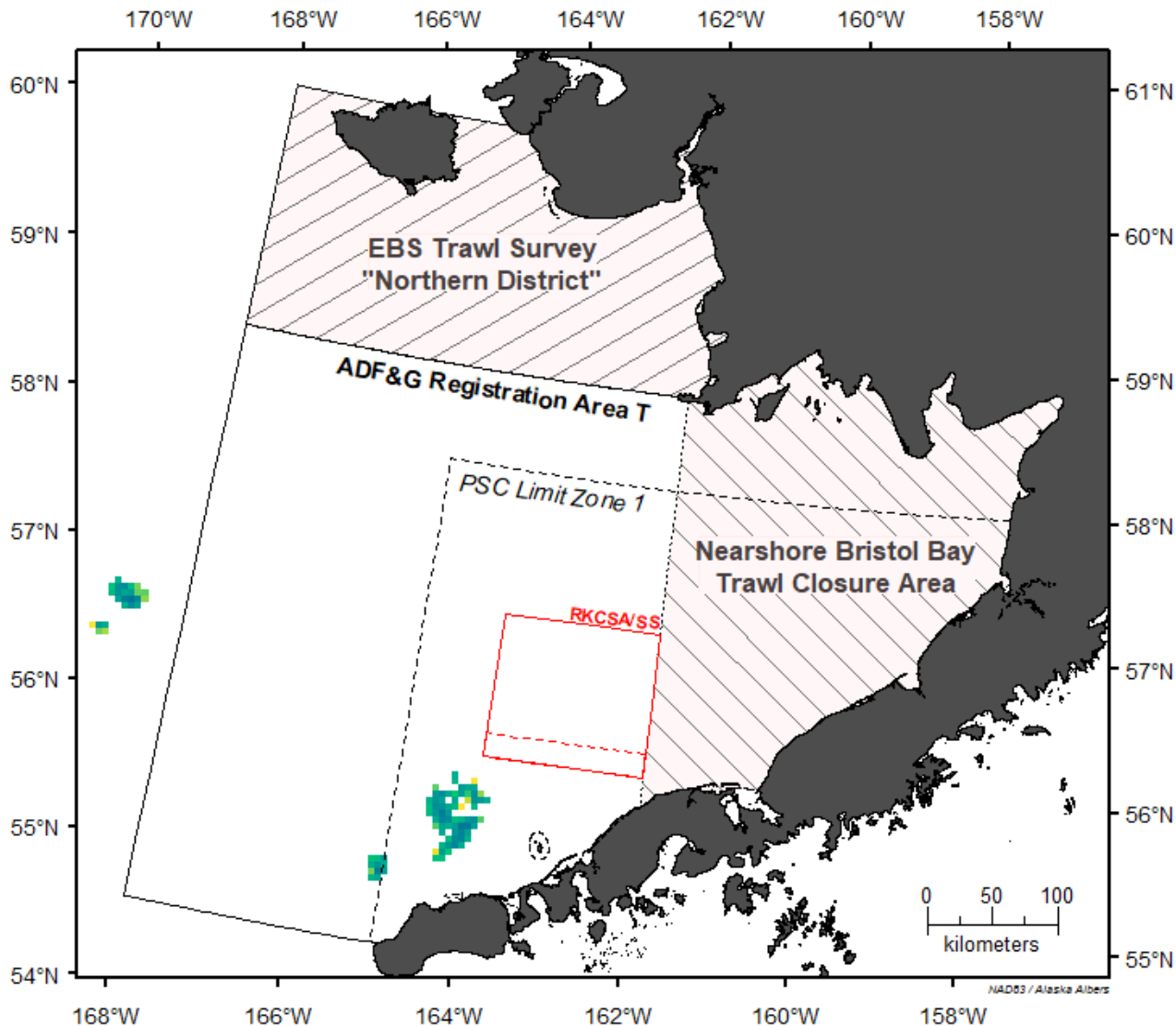
November 2013: Total Swept Area (SA), by PTR (20.5 km²)



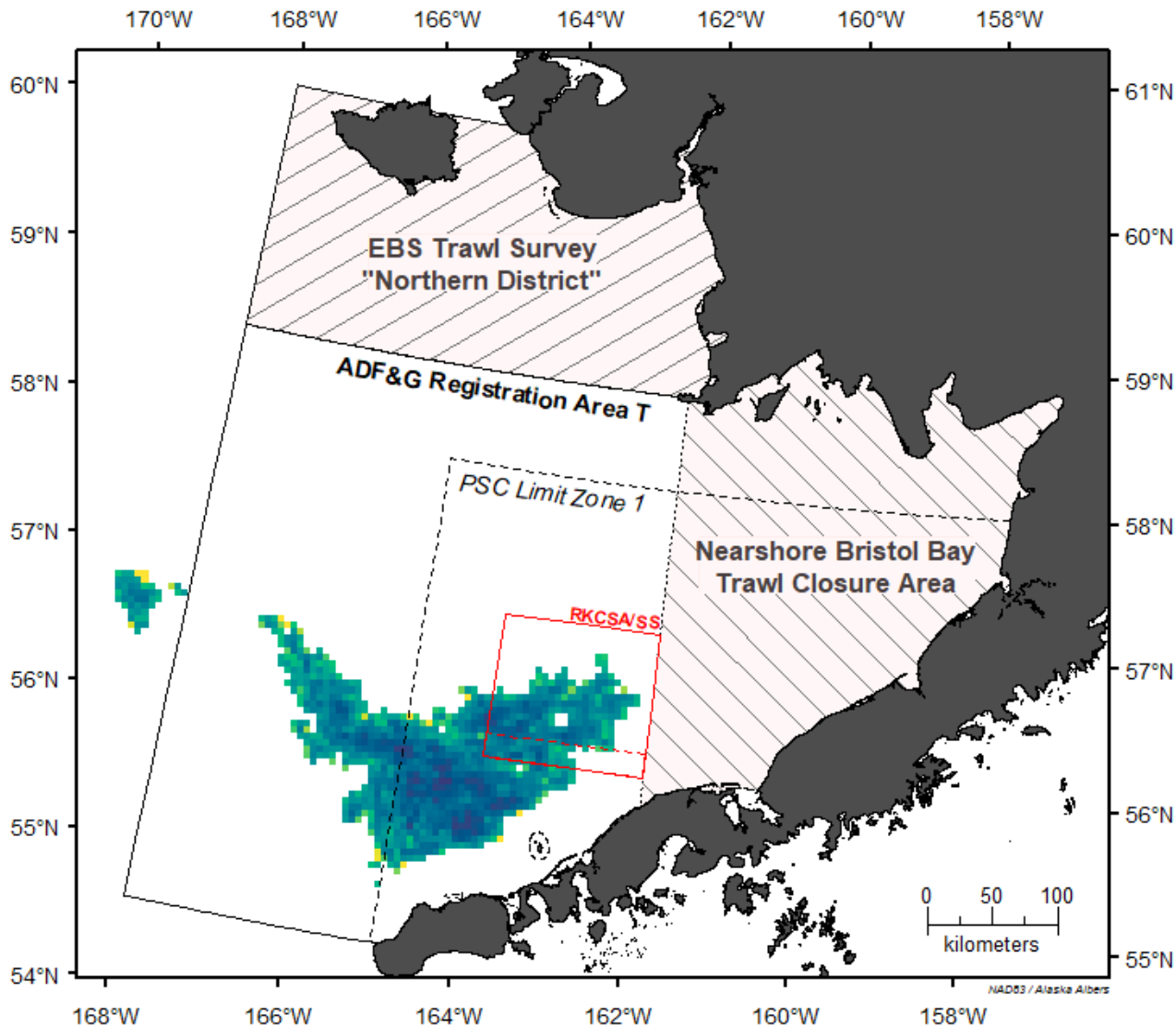
SA, km²



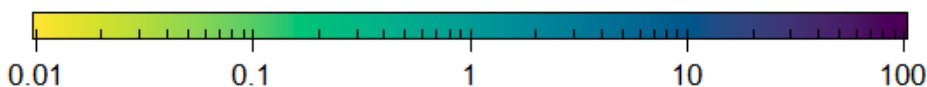
January 2014: Total Swept Area (SA), by PTR (134.4 km²)



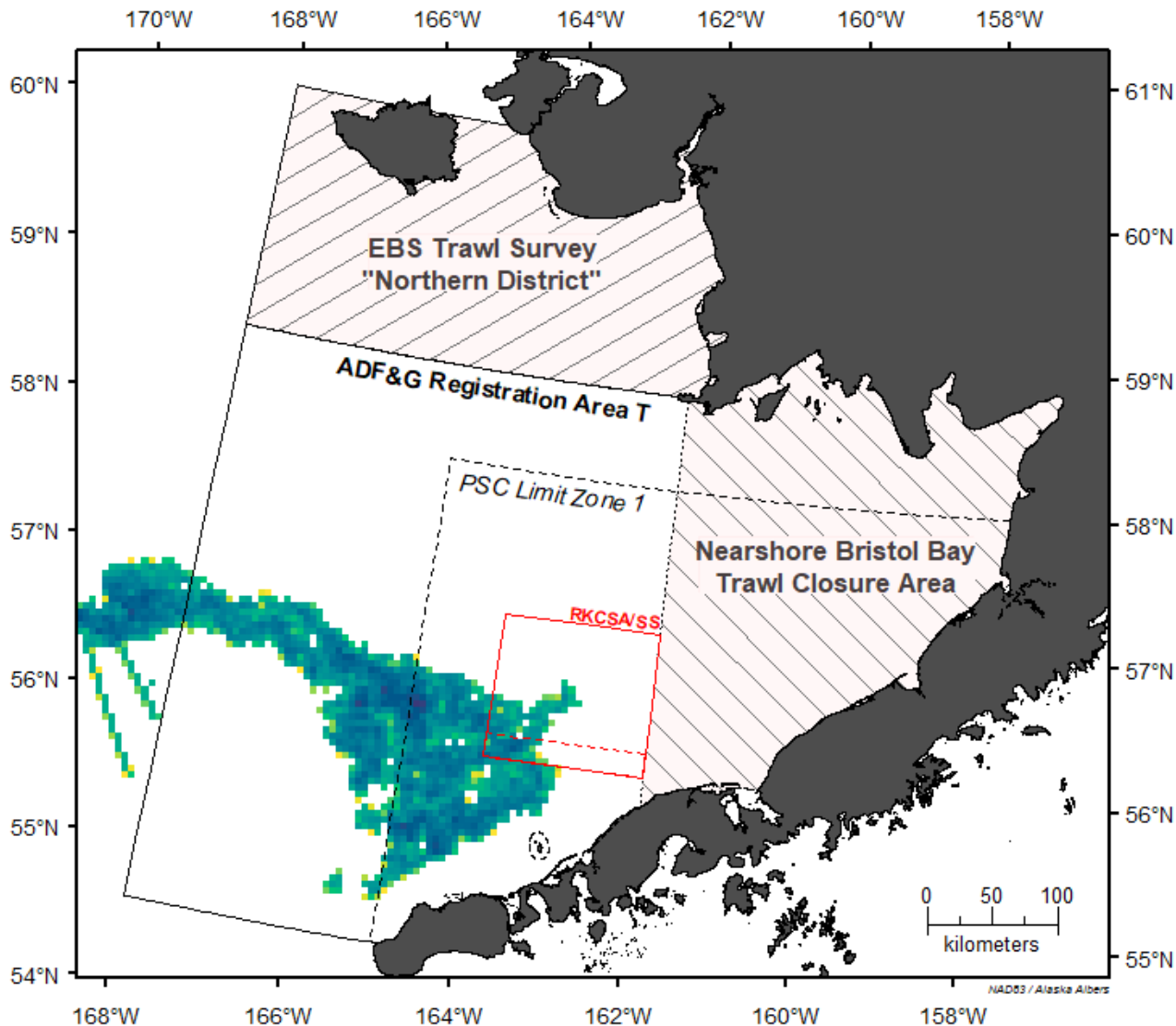
February 2014: Total Swept Area (SA), by PTR (8,011.2 km²)



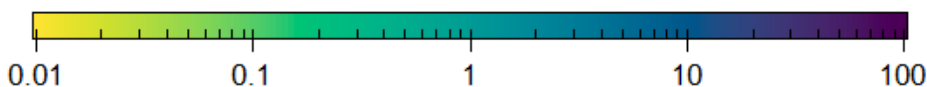
SA, km²



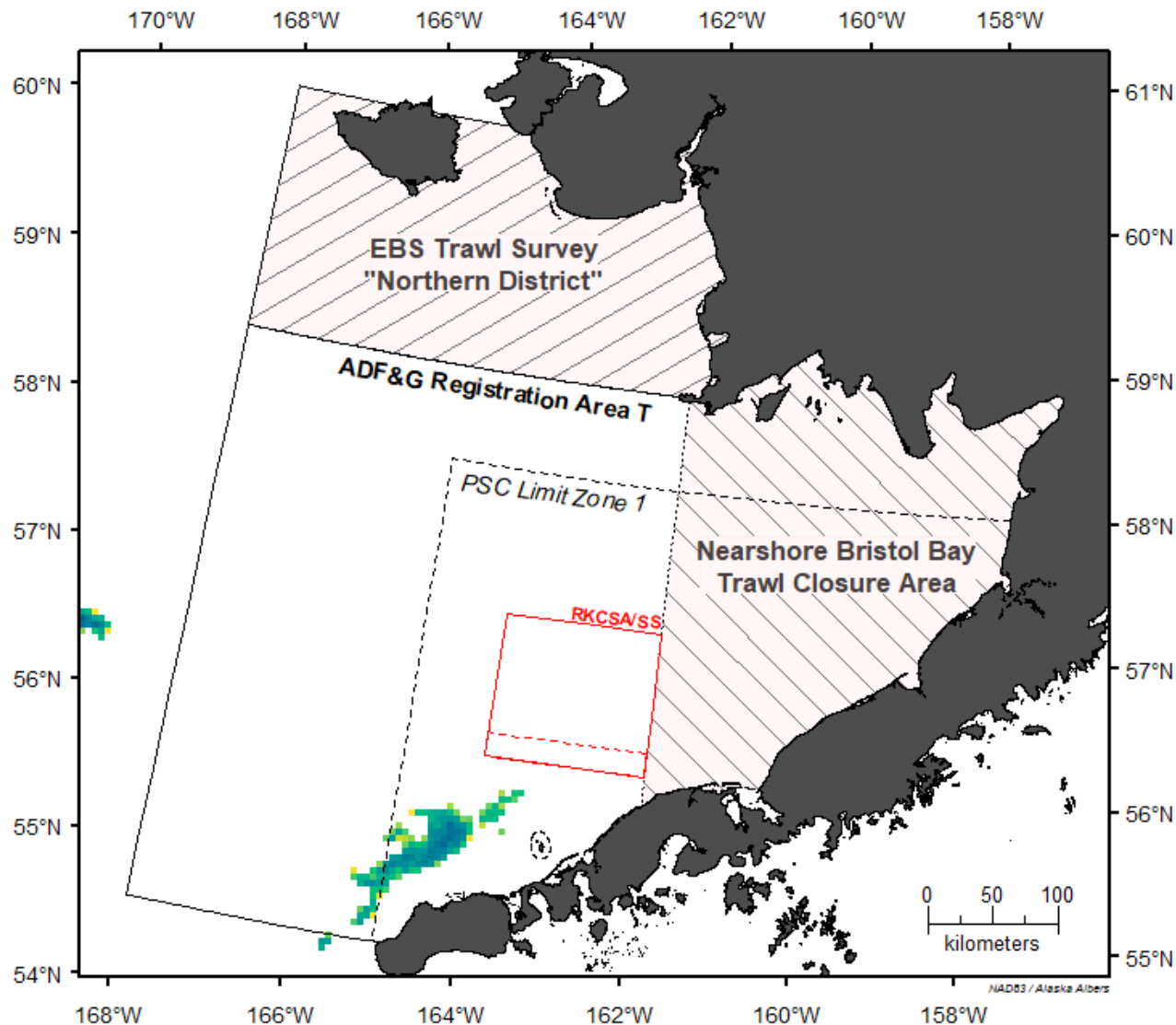
March 2014: Total Swept Area (SA), by PTR (4,575.7 km²)



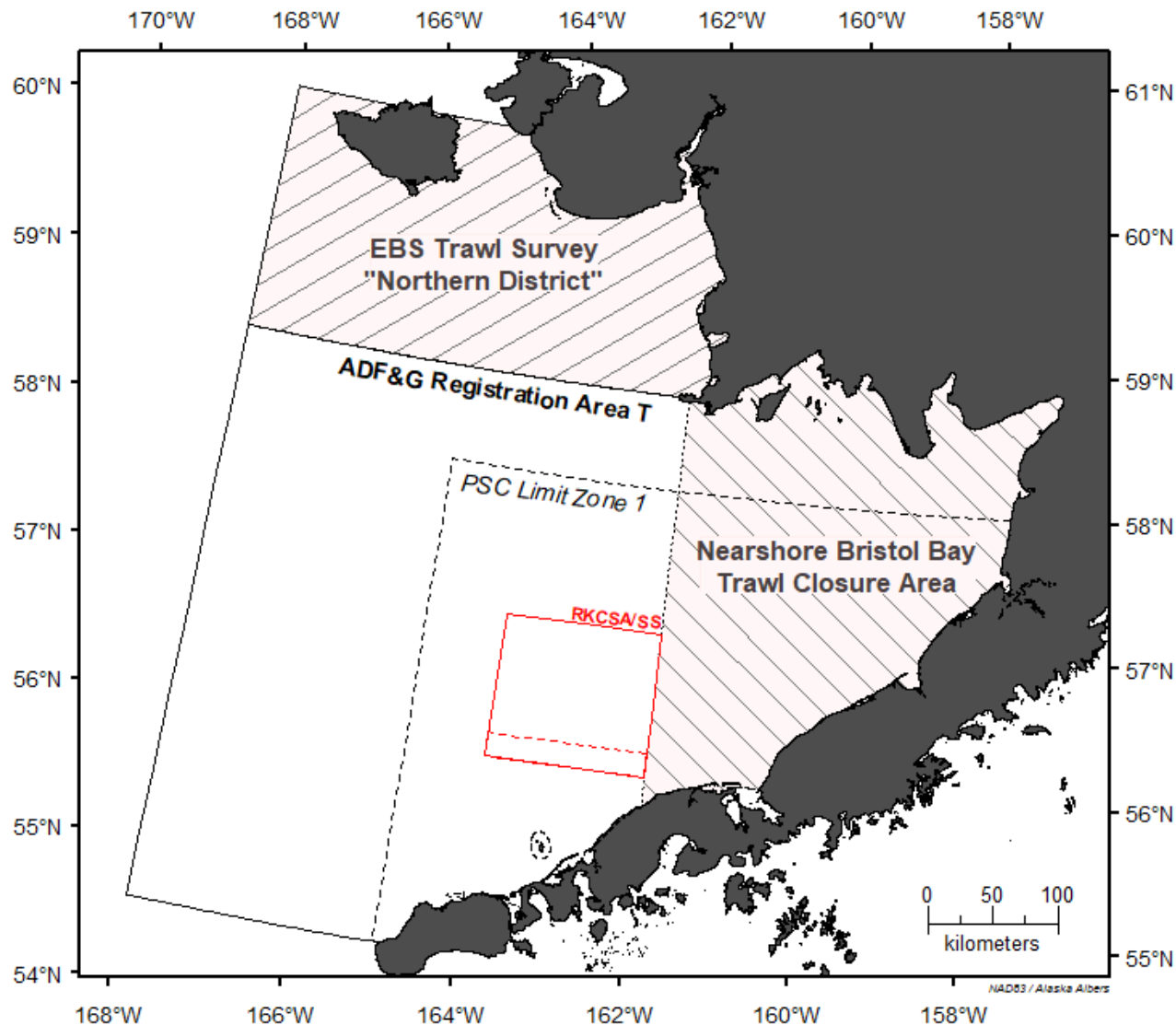
SA, km²



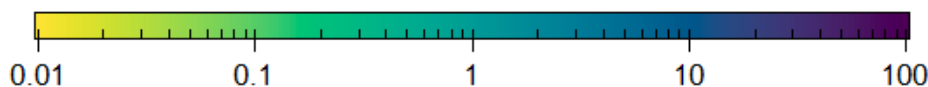
April 2014: Total Swept Area (SA), by PTR (271.7 km²)



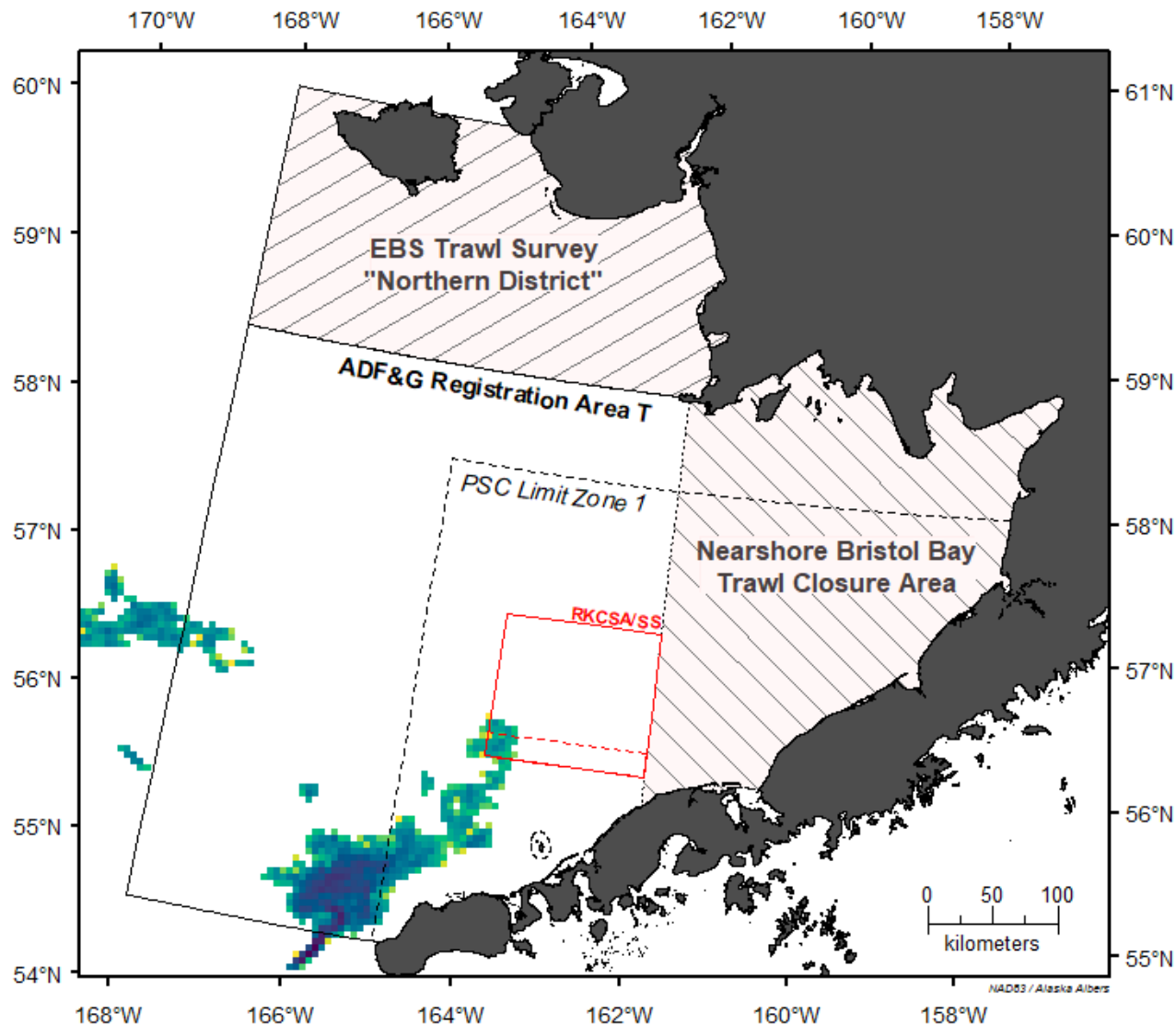
May 2014: Total Swept Area (SA), by PTR (0 km²)



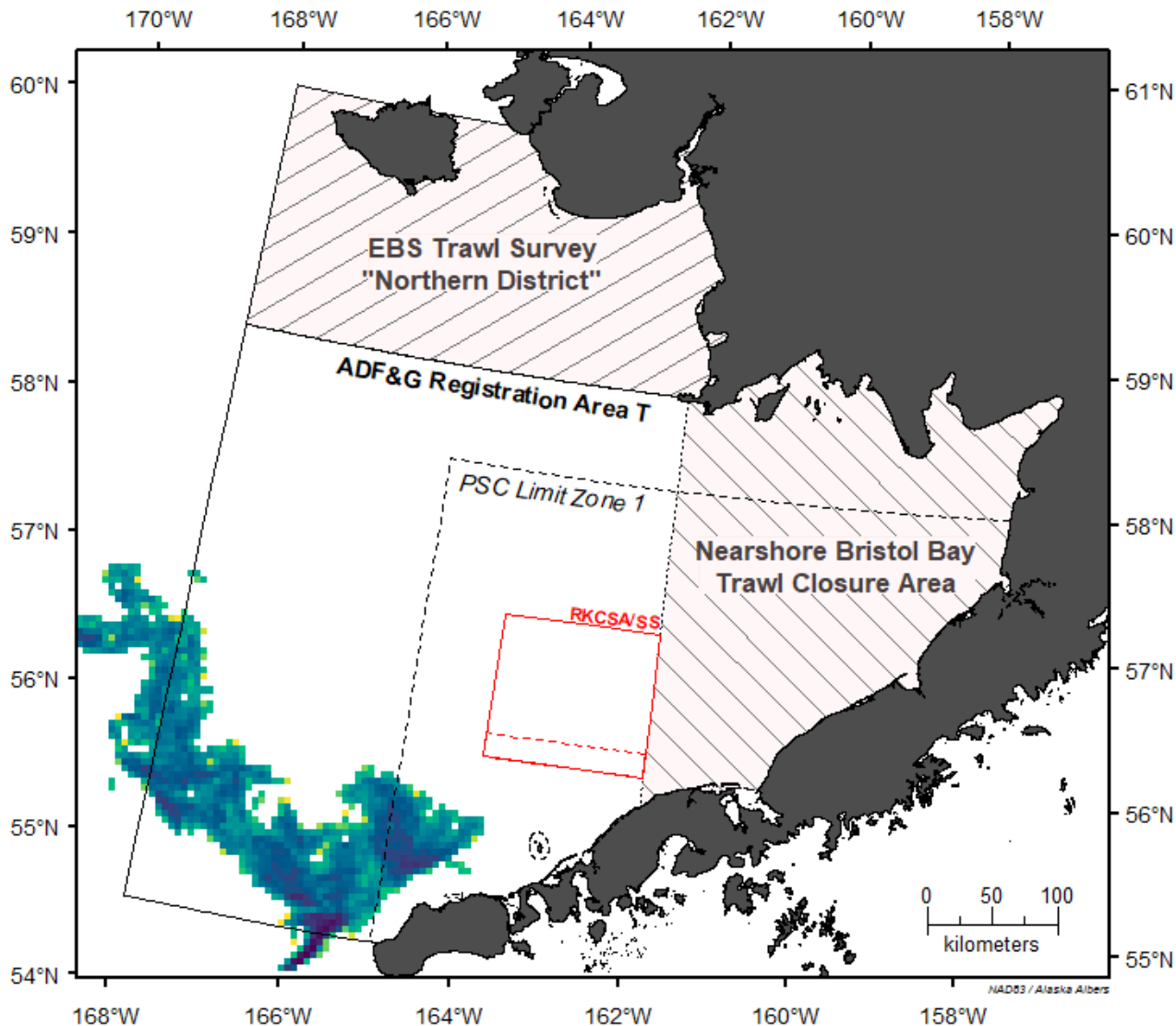
SA, km²



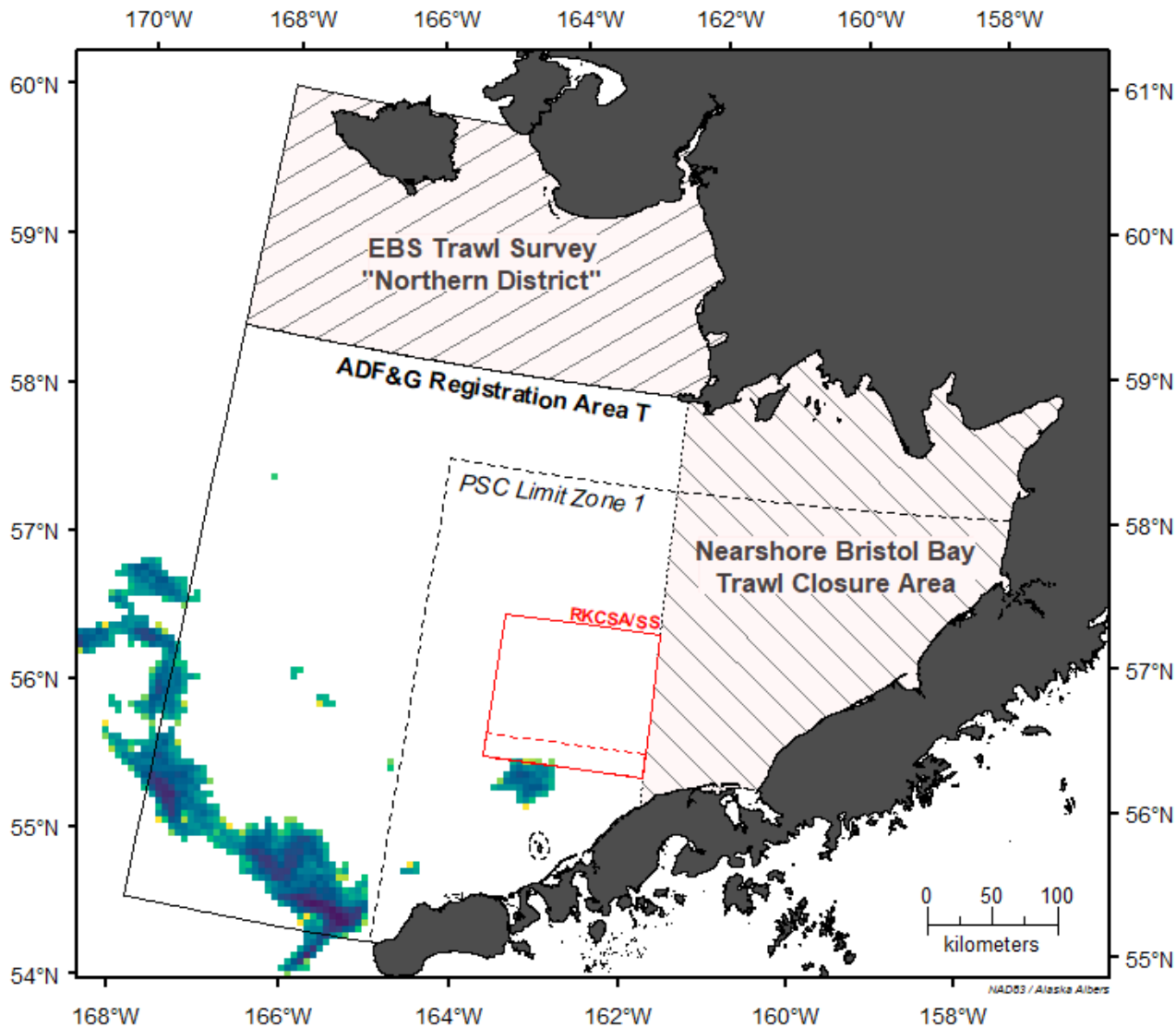
June 2014: Total Swept Area (SA), by PTR (2,810.9 km²)



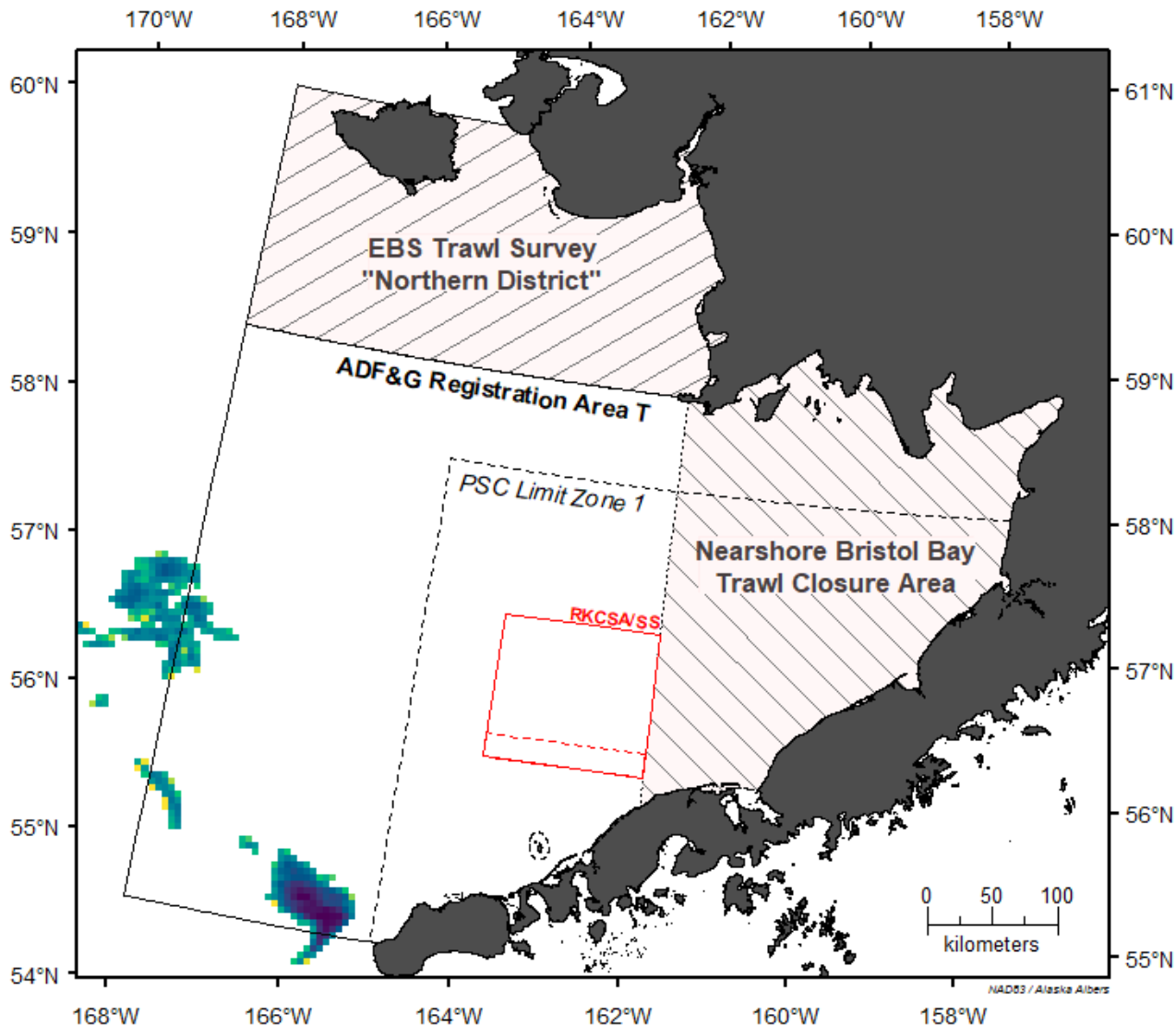
July 2014: Total Swept Area (SA), by PTR (6,464.8 km²)



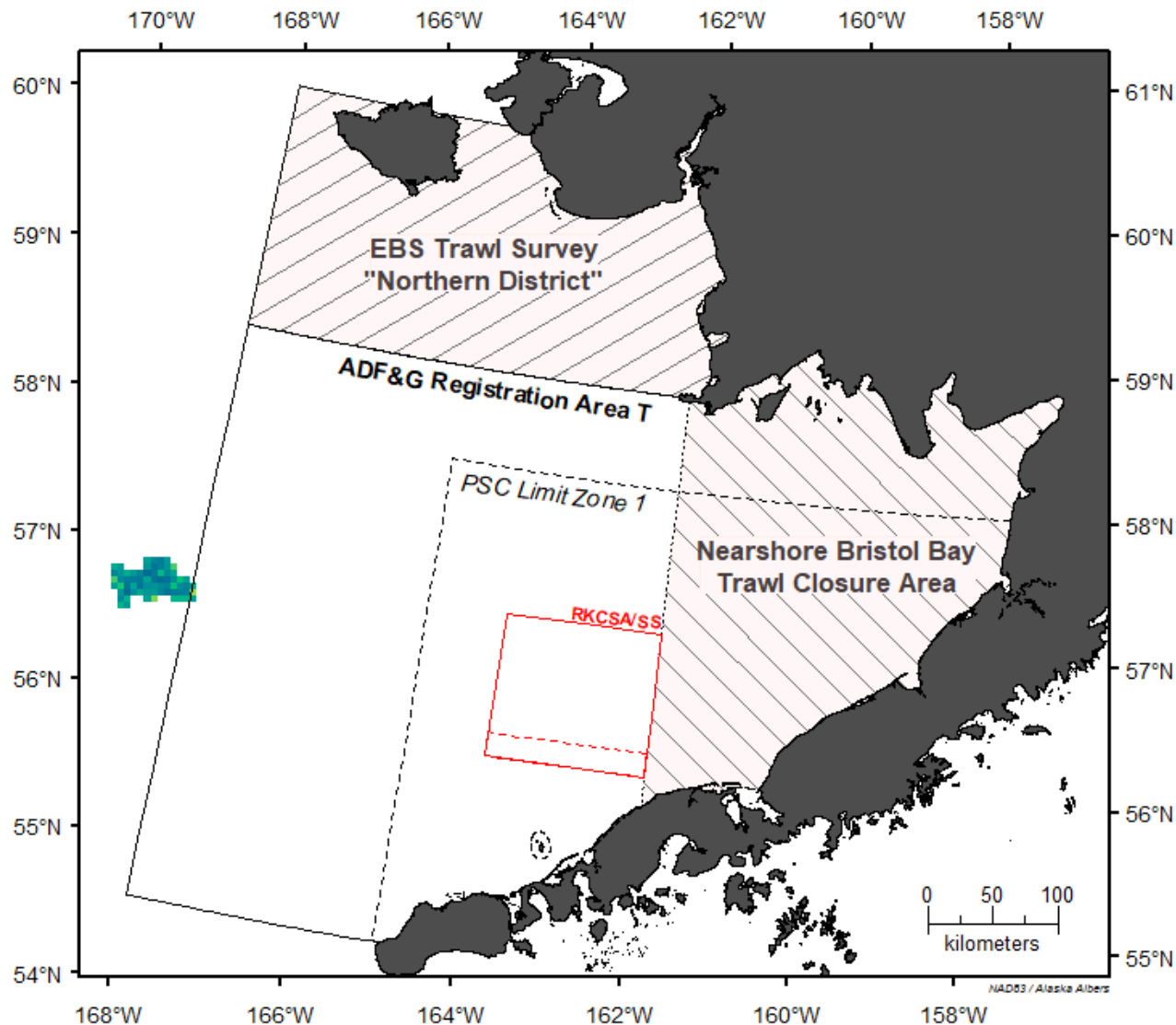
August 2014: Total Swept Area (SA), by PTR (3,648 km²)



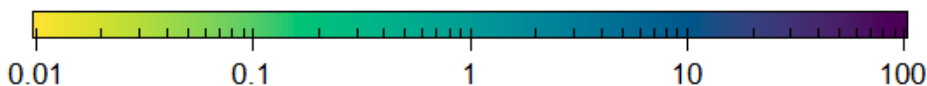
September 2014: Total Swept Area (SA), by PTR (2,842 km²)



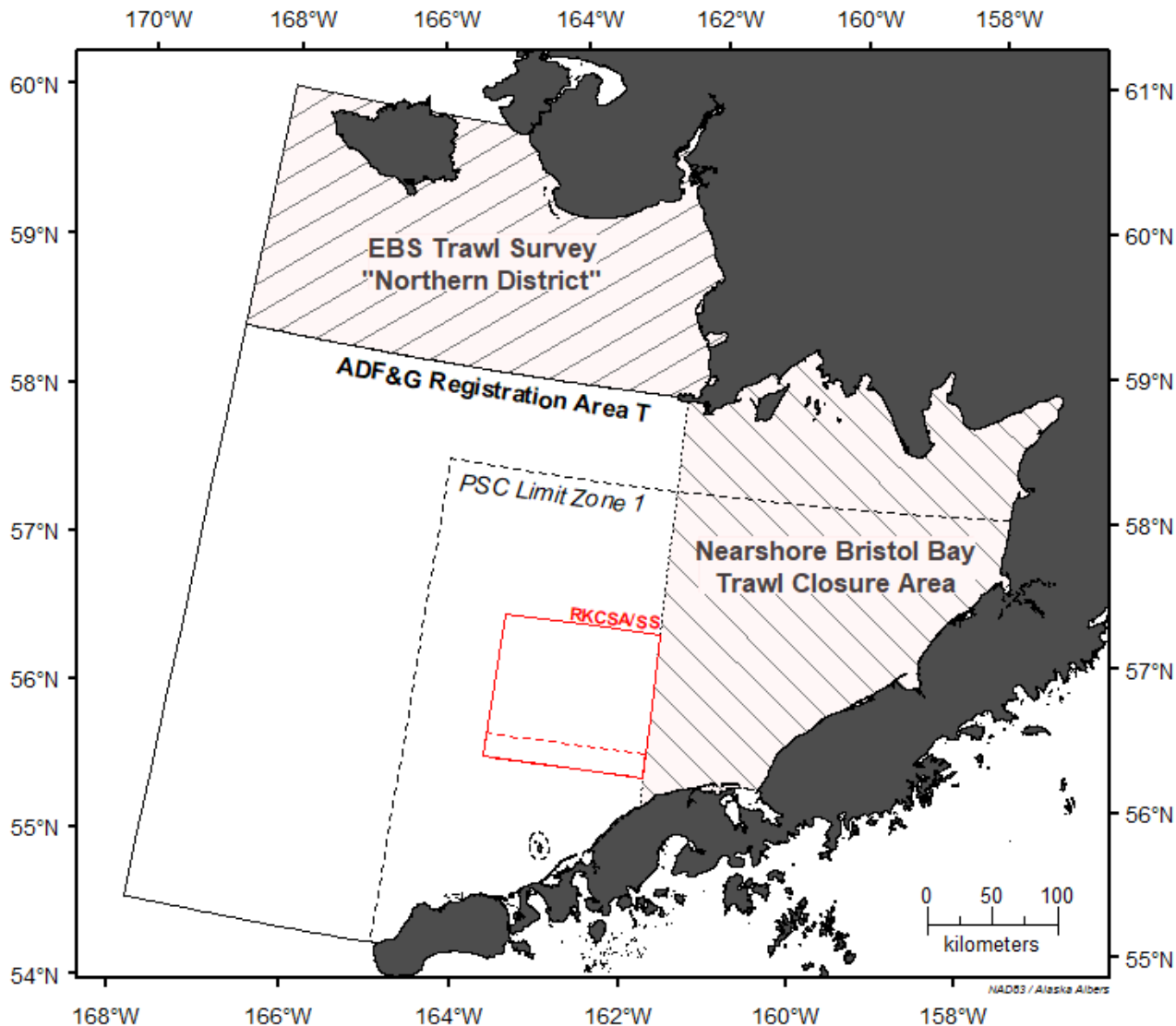
October 2014: Total Swept Area (SA), by PTR (1.6 km²)



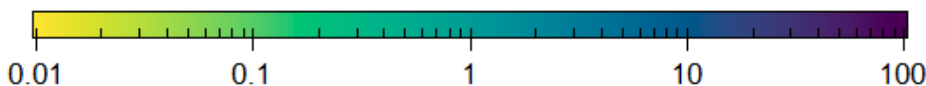
SA, km²



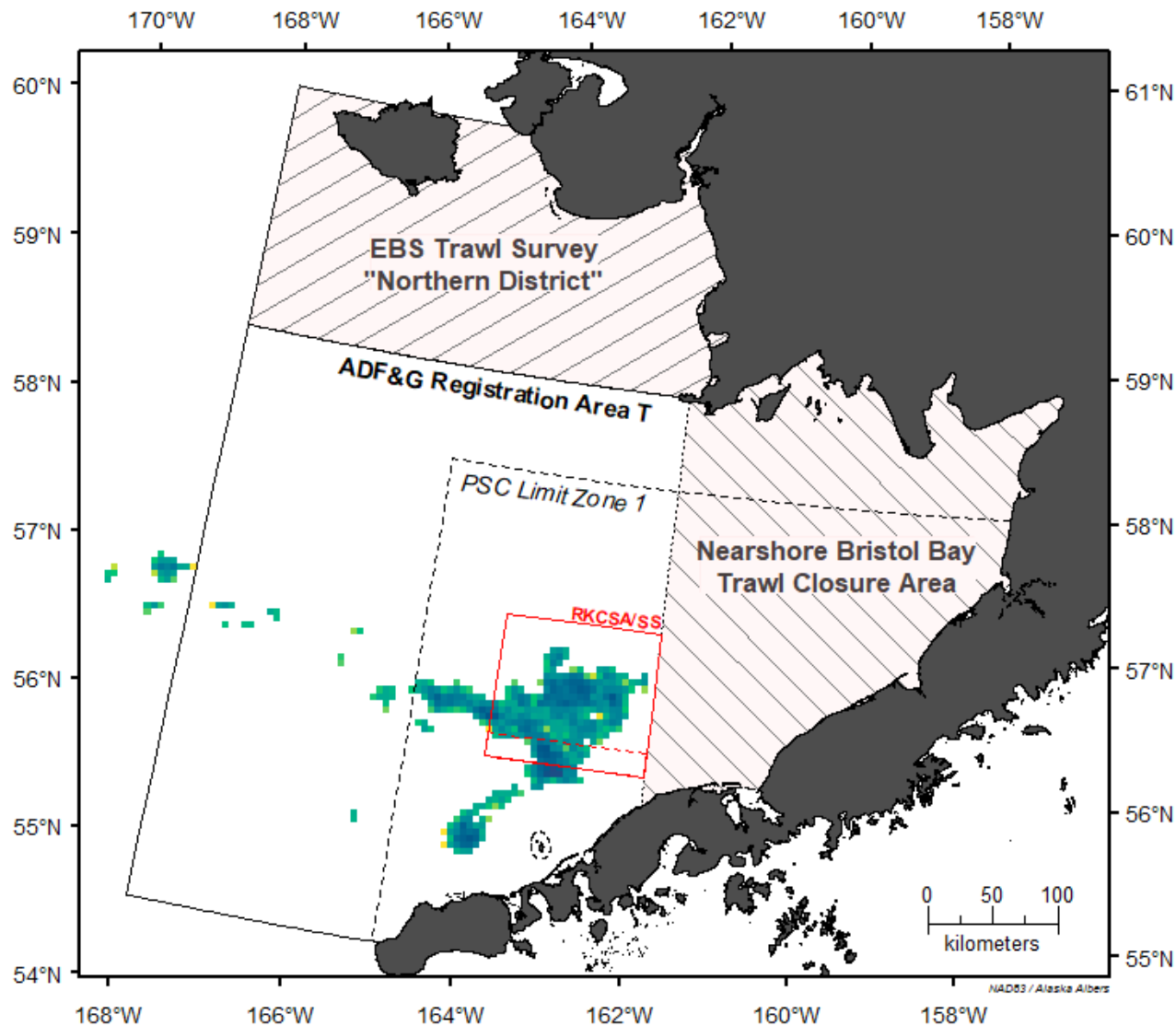
November 2014: Total Swept Area (SA), by PTR (0 km²)



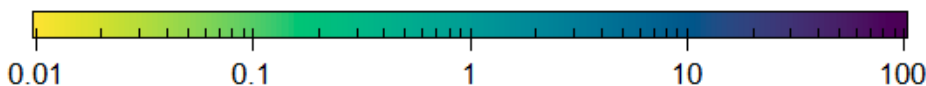
SA, km²



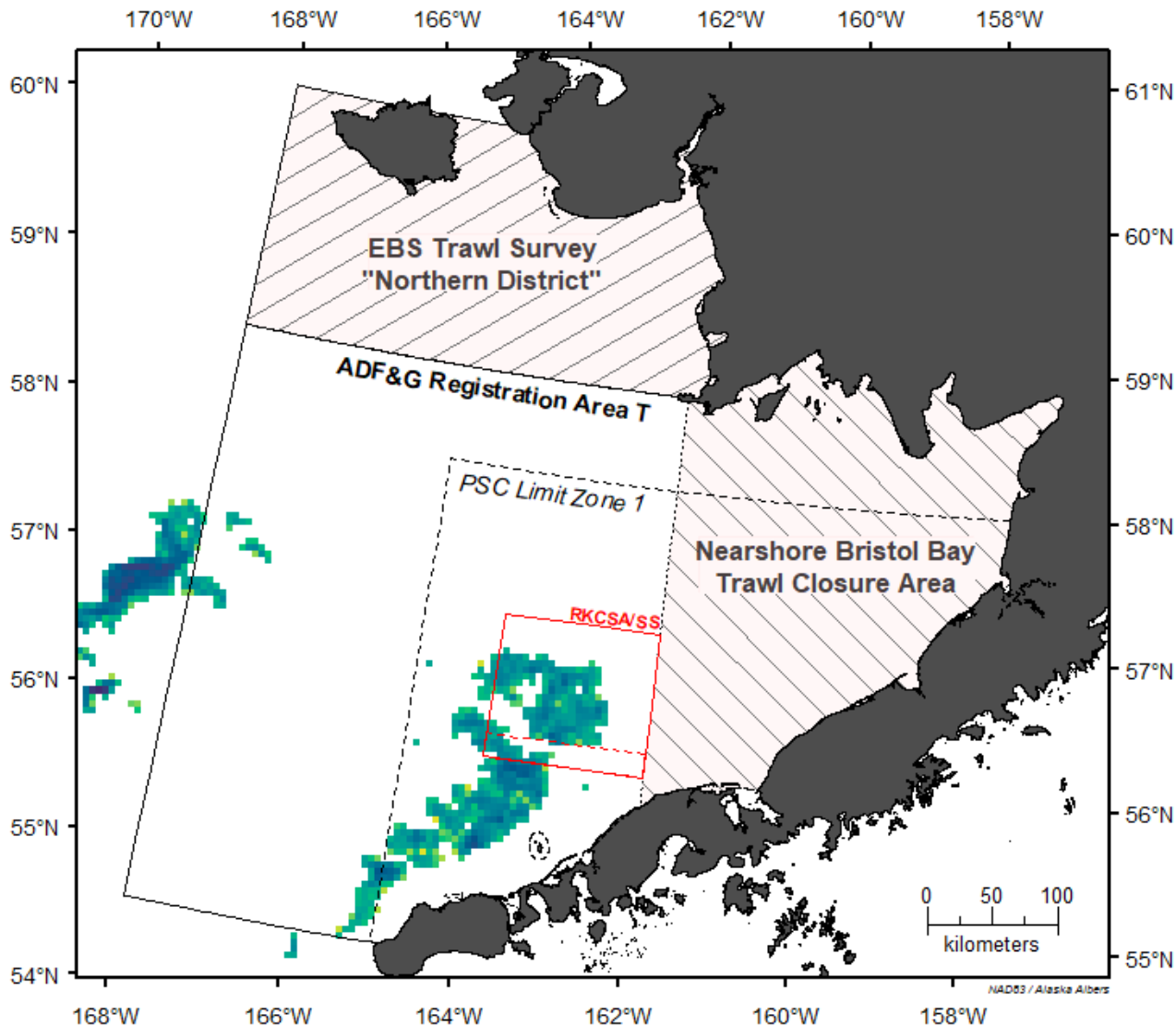
January 2015: Total Swept Area (SA), by PTR (2,478.1 km²)



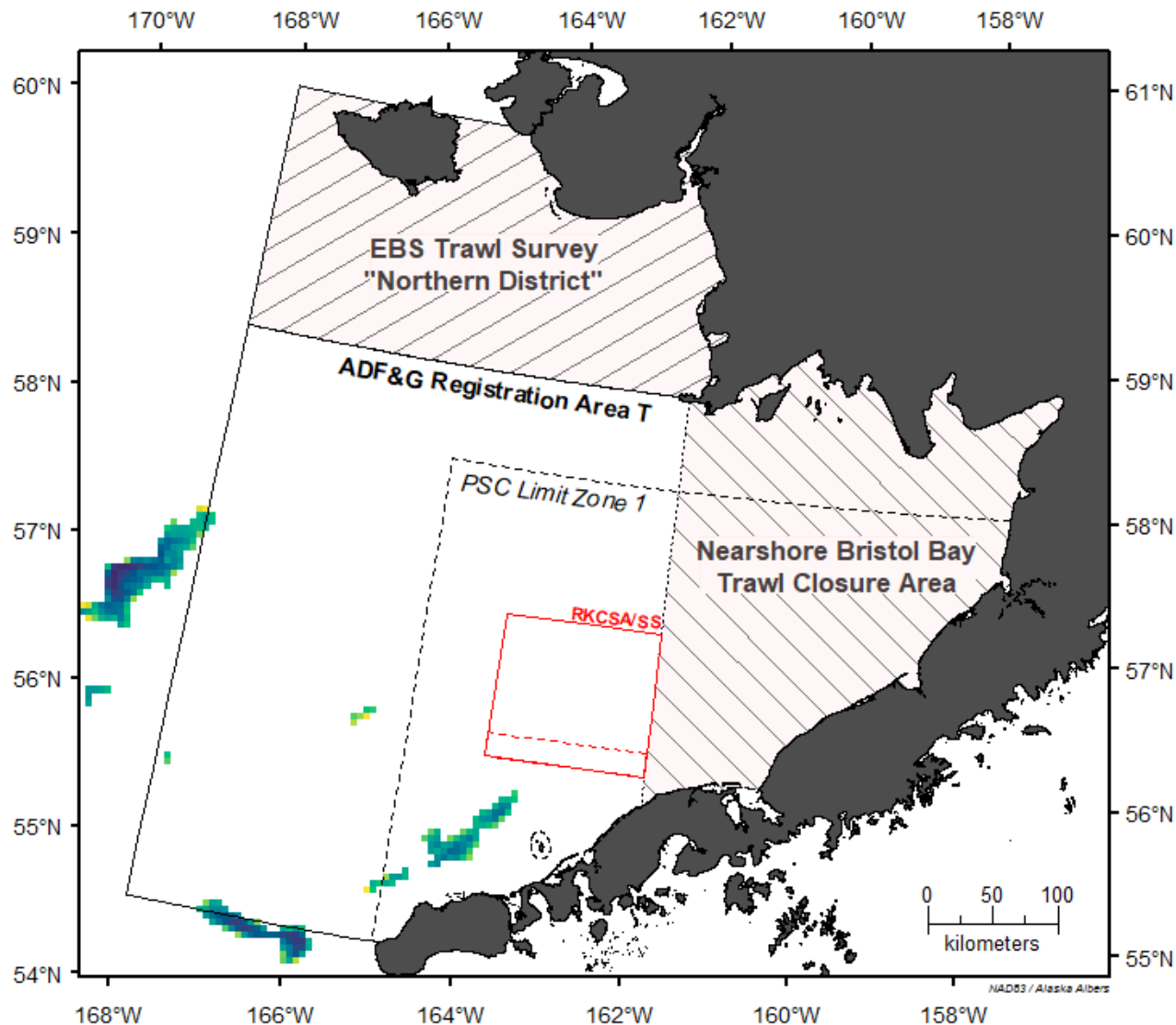
SA, km²



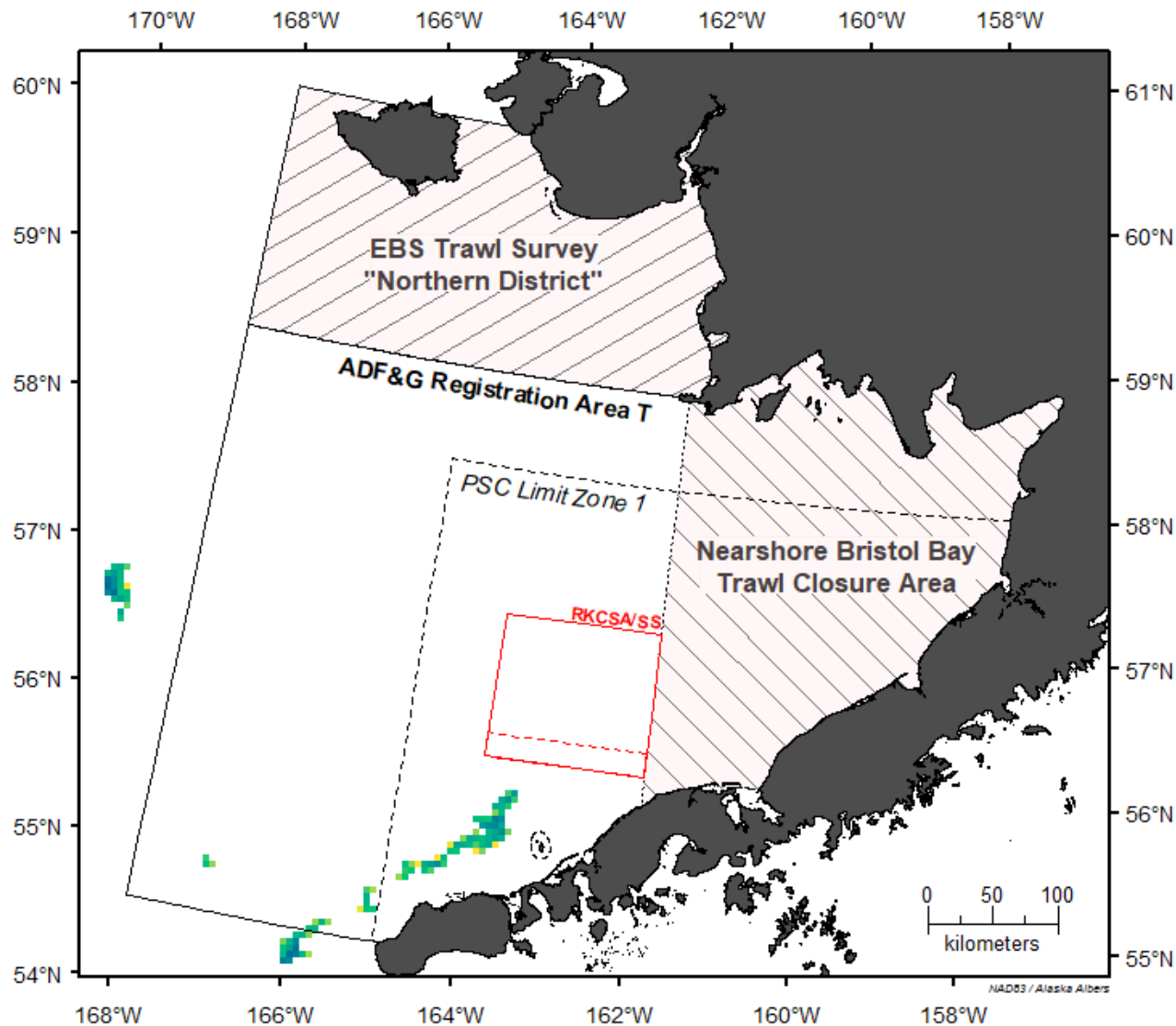
February 2015: Total Swept Area (SA), by PTR (2,045.5 km²)



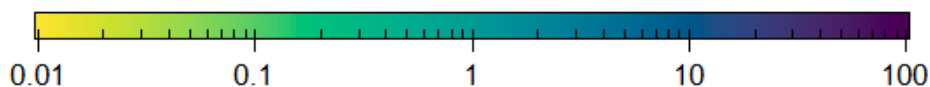
March 2015: Total Swept Area (SA), by PTR (210.5 km²)



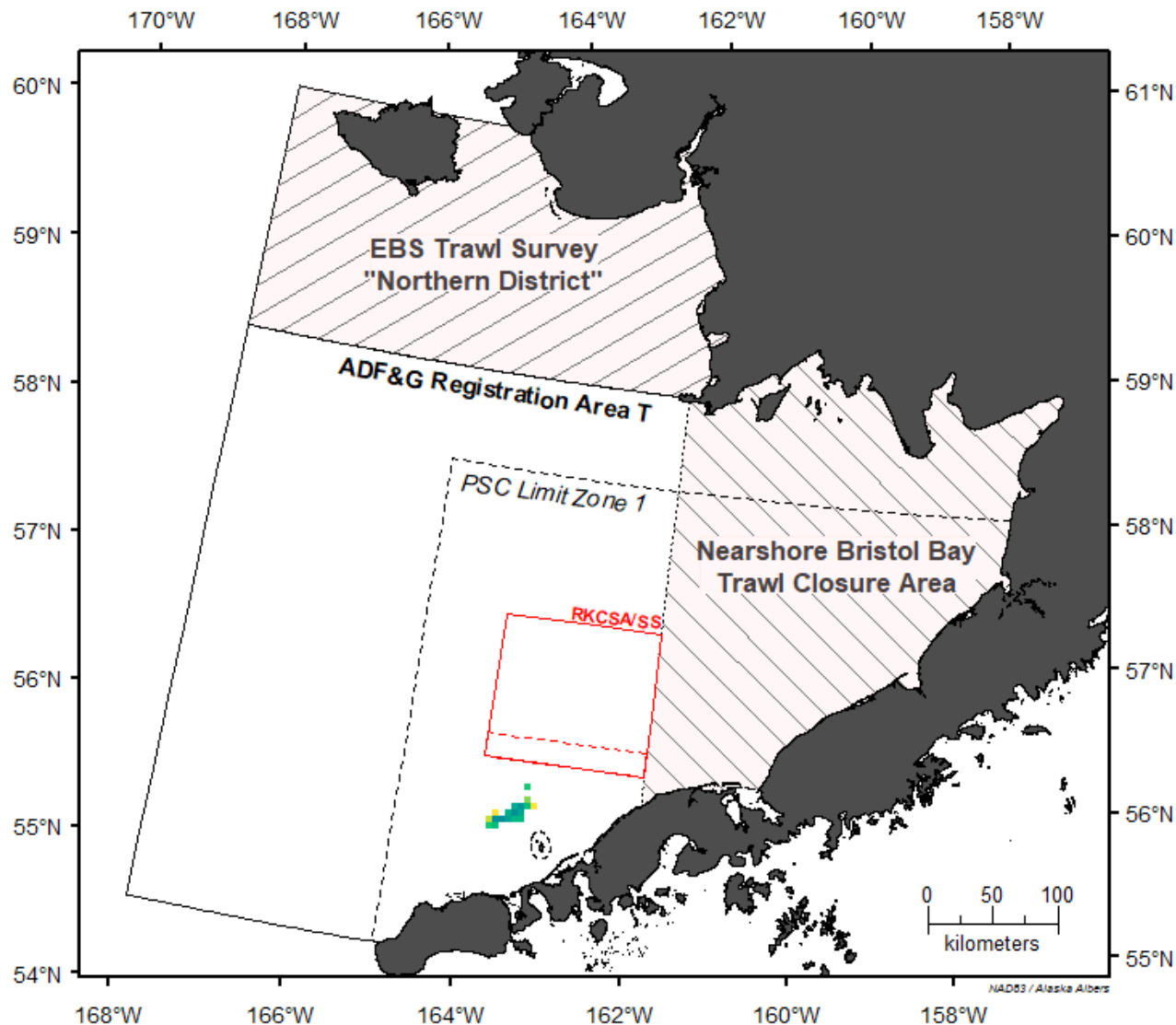
April 2015: Total Swept Area (SA), by PTR (59.1 km²)



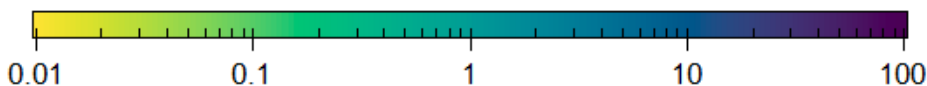
SA, km²



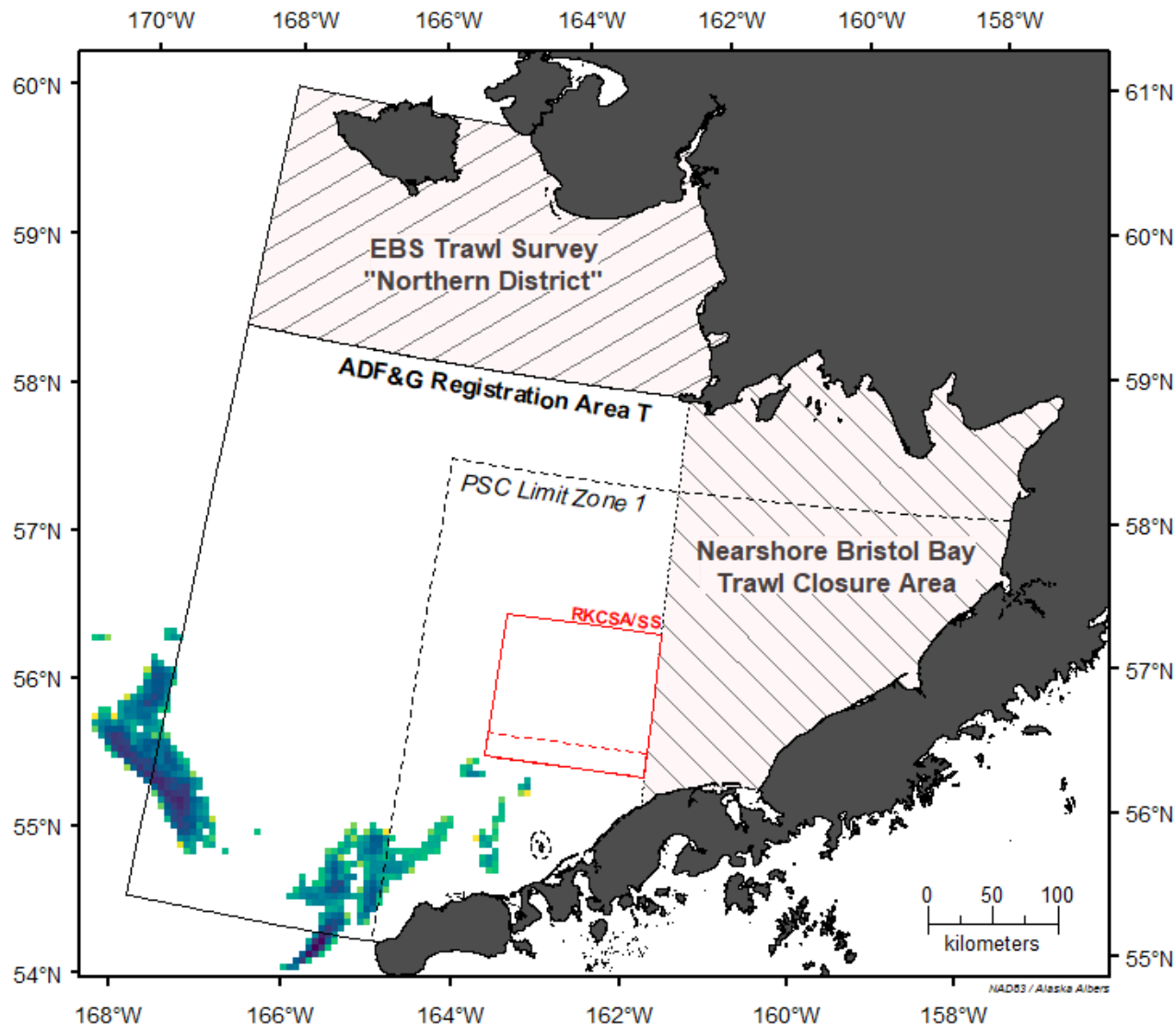
May 2015: Total Swept Area (SA), by PTR (19.9 km²)



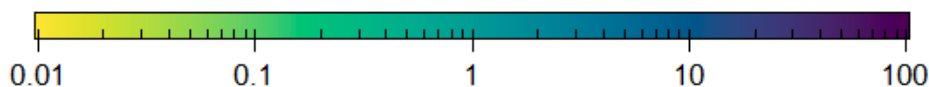
SA, km²



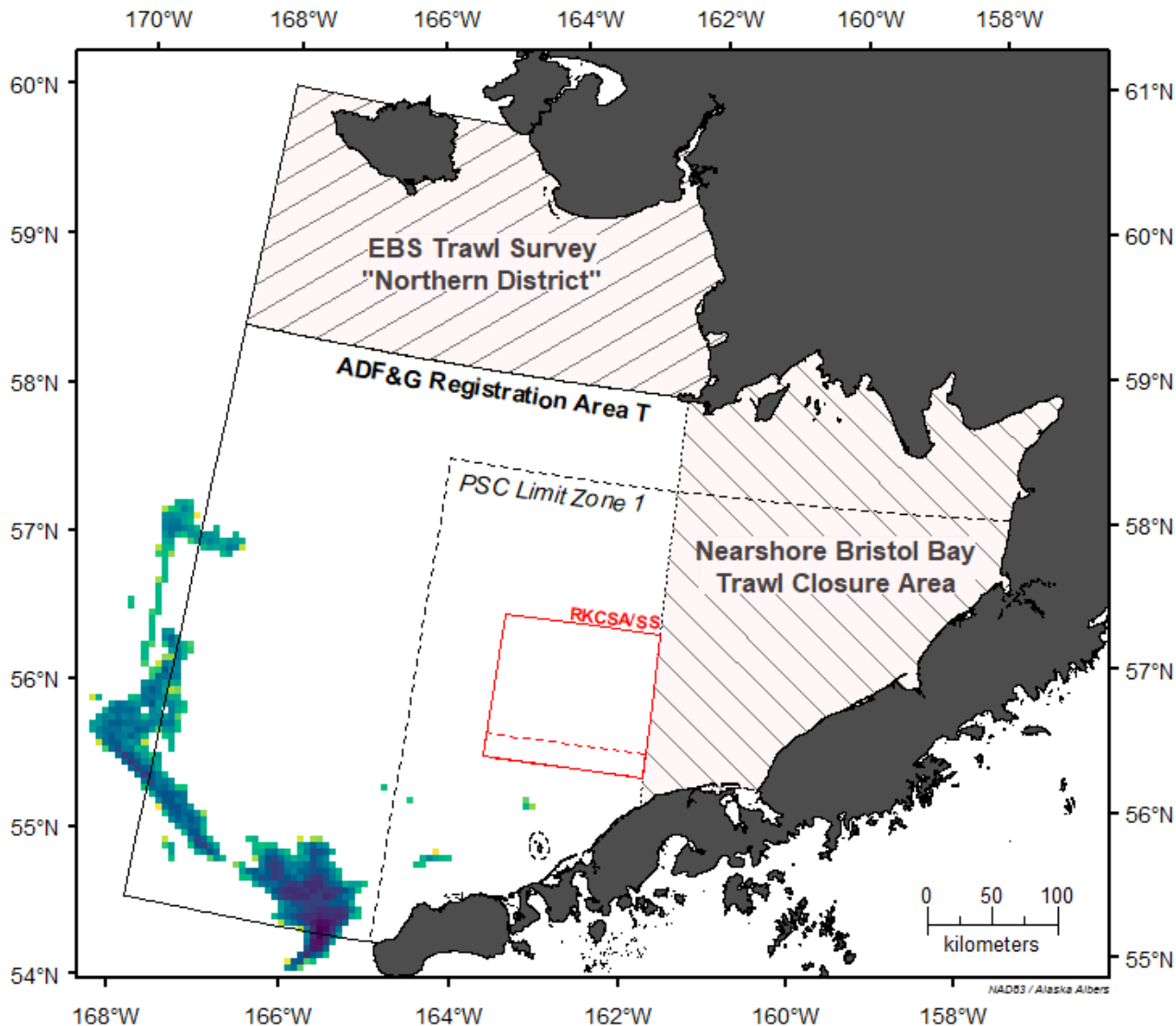
June 2015: Total Swept Area (SA), by PTR (1,739.2 km²)



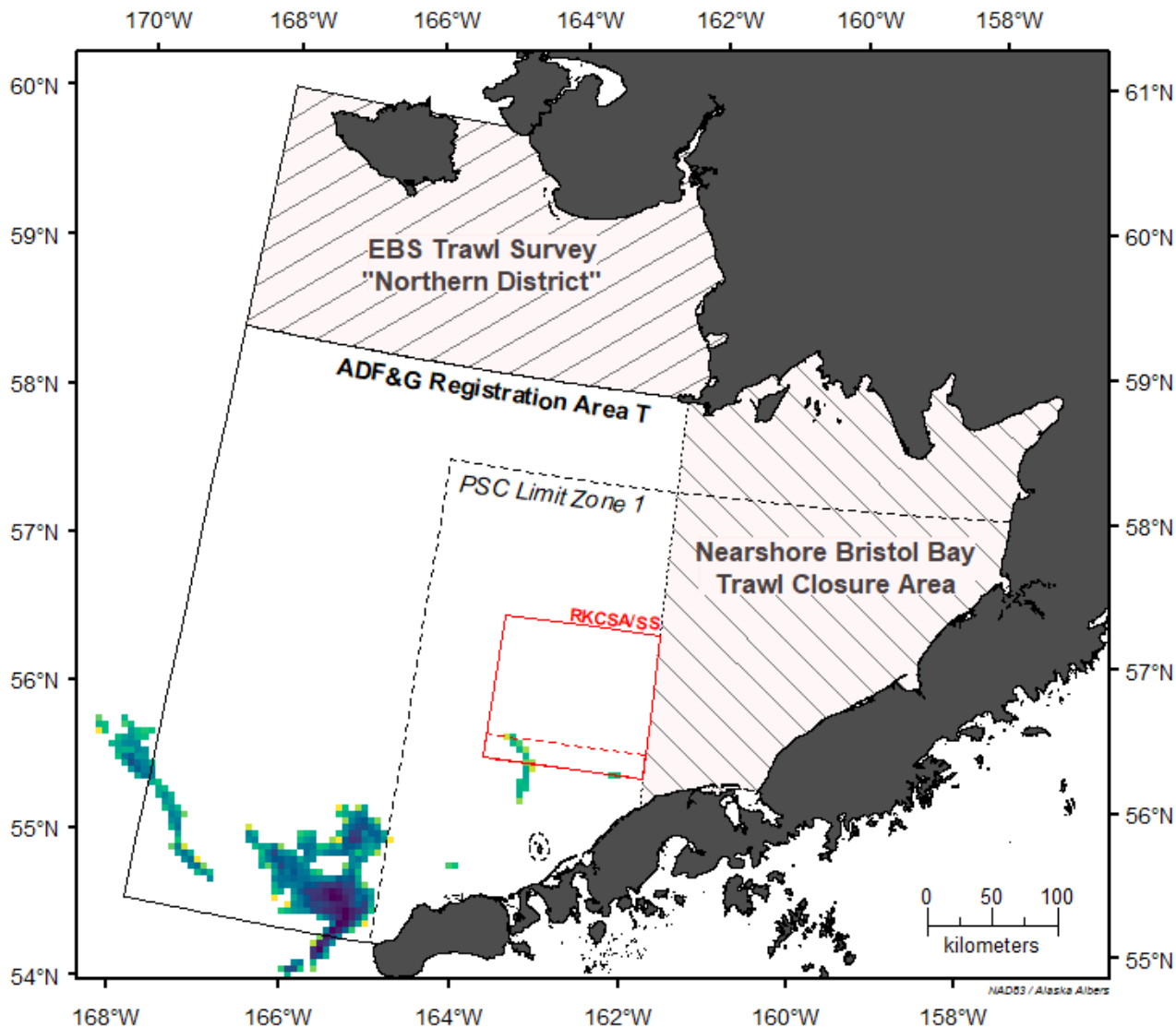
SA, km²



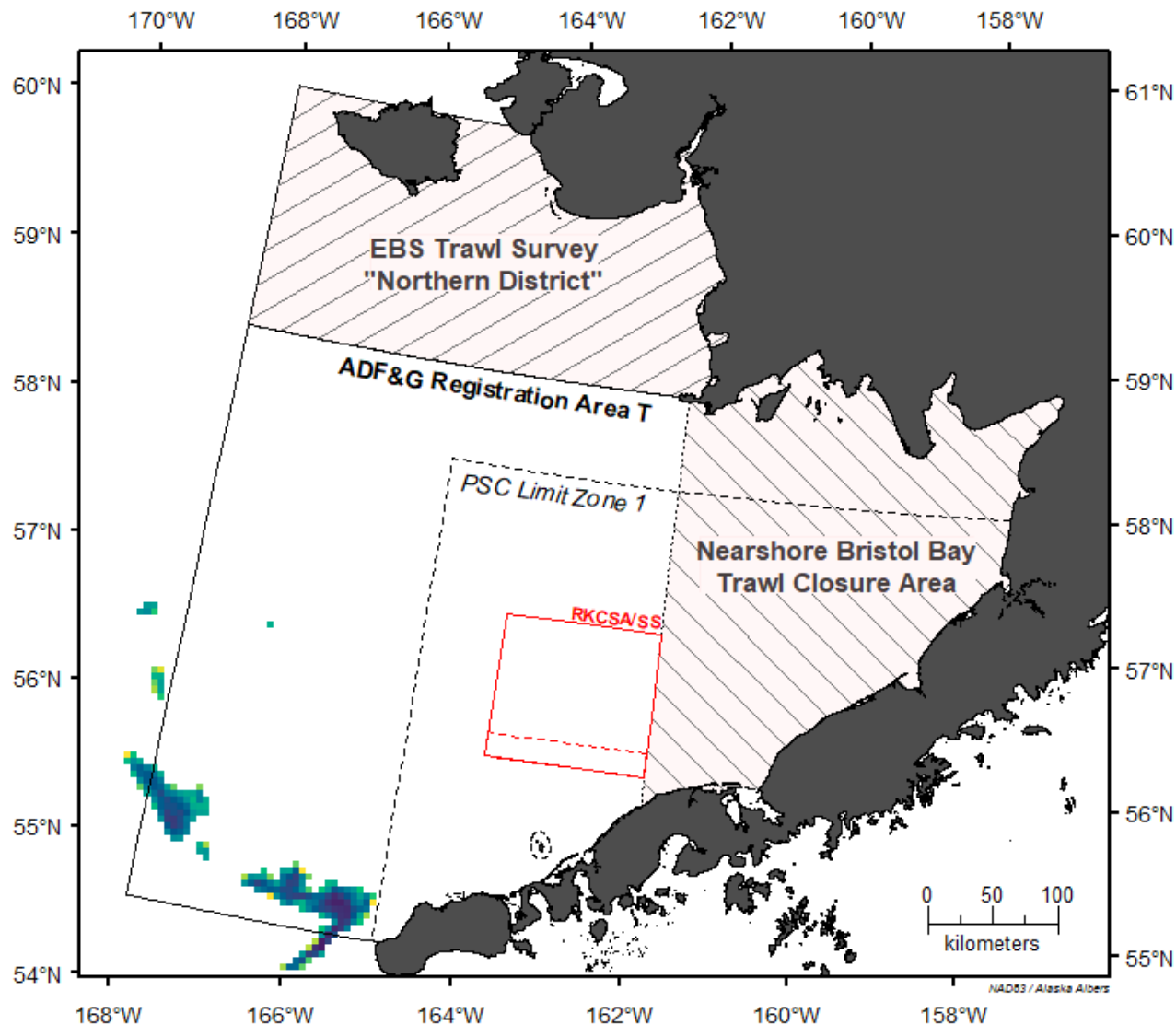
July 2015: Total Swept Area (SA), by PTR (3,232.3 km²)



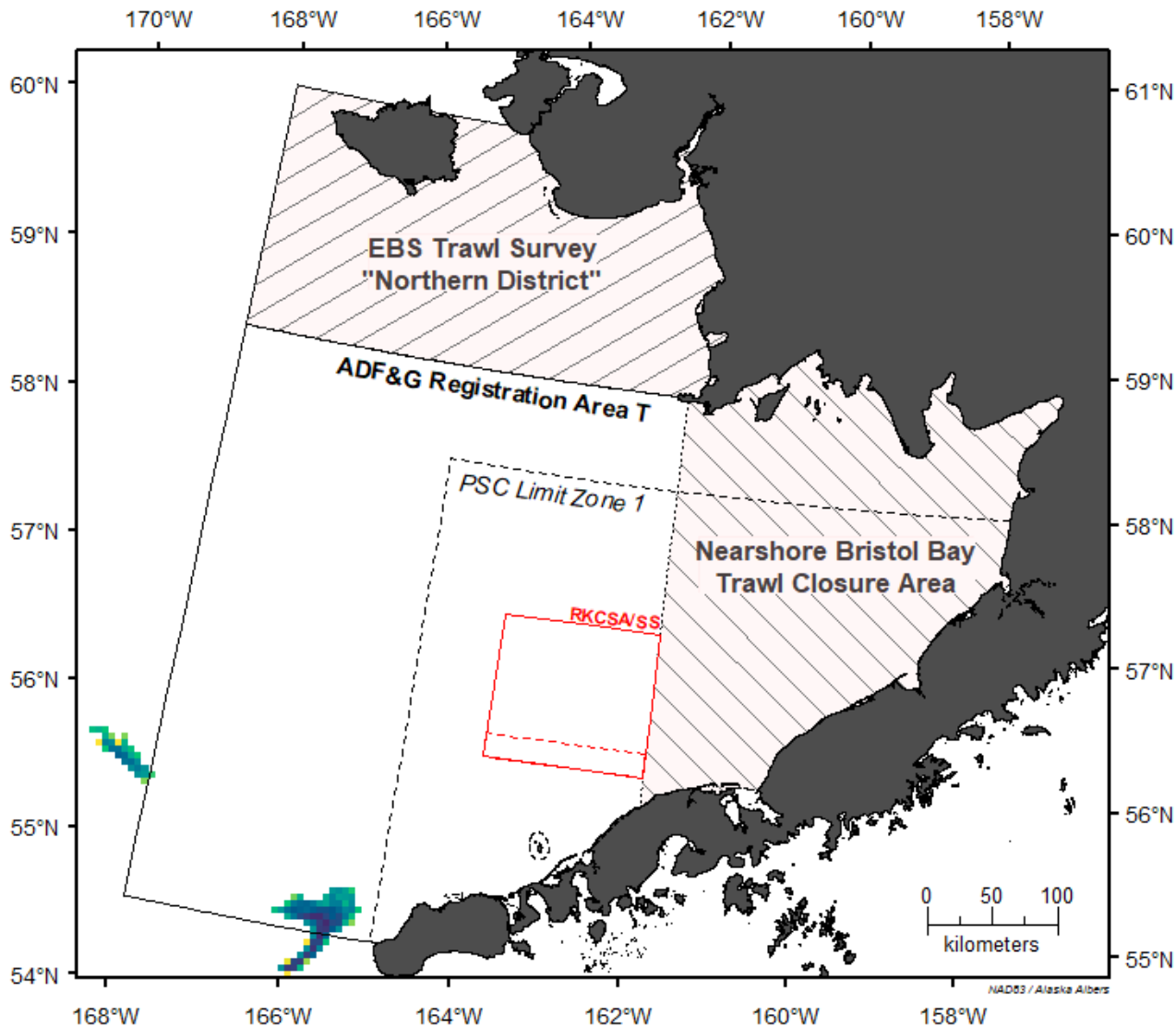
August 2015: Total Swept Area (SA), by PTR (2,762.2 km²)



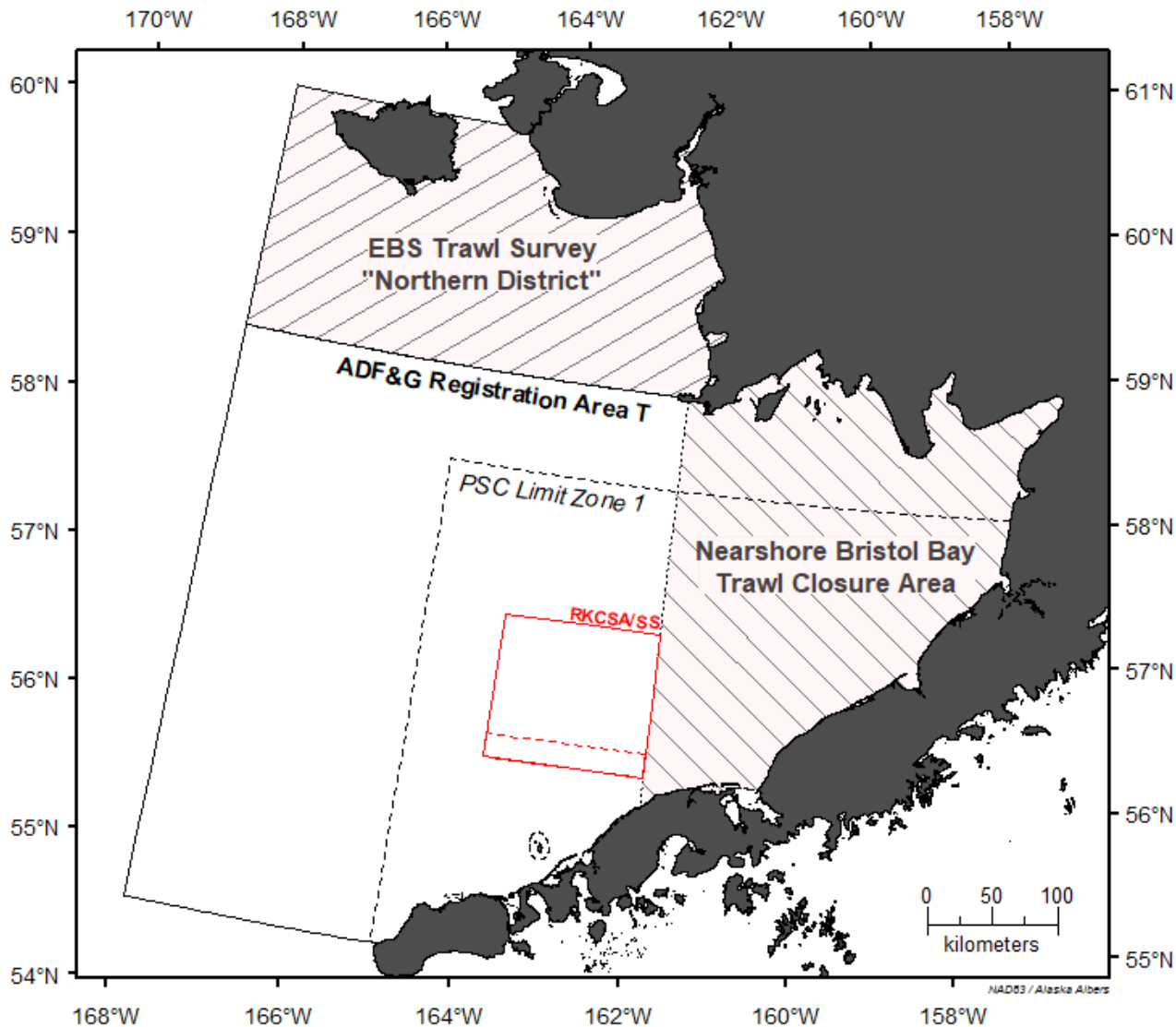
September 2015: Total Swept Area (SA), by PTR (1,462.4 km²)



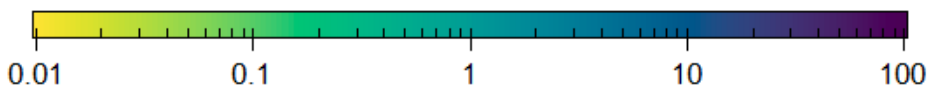
October 2015: Total Swept Area (SA), by PTR (484.2 km²)



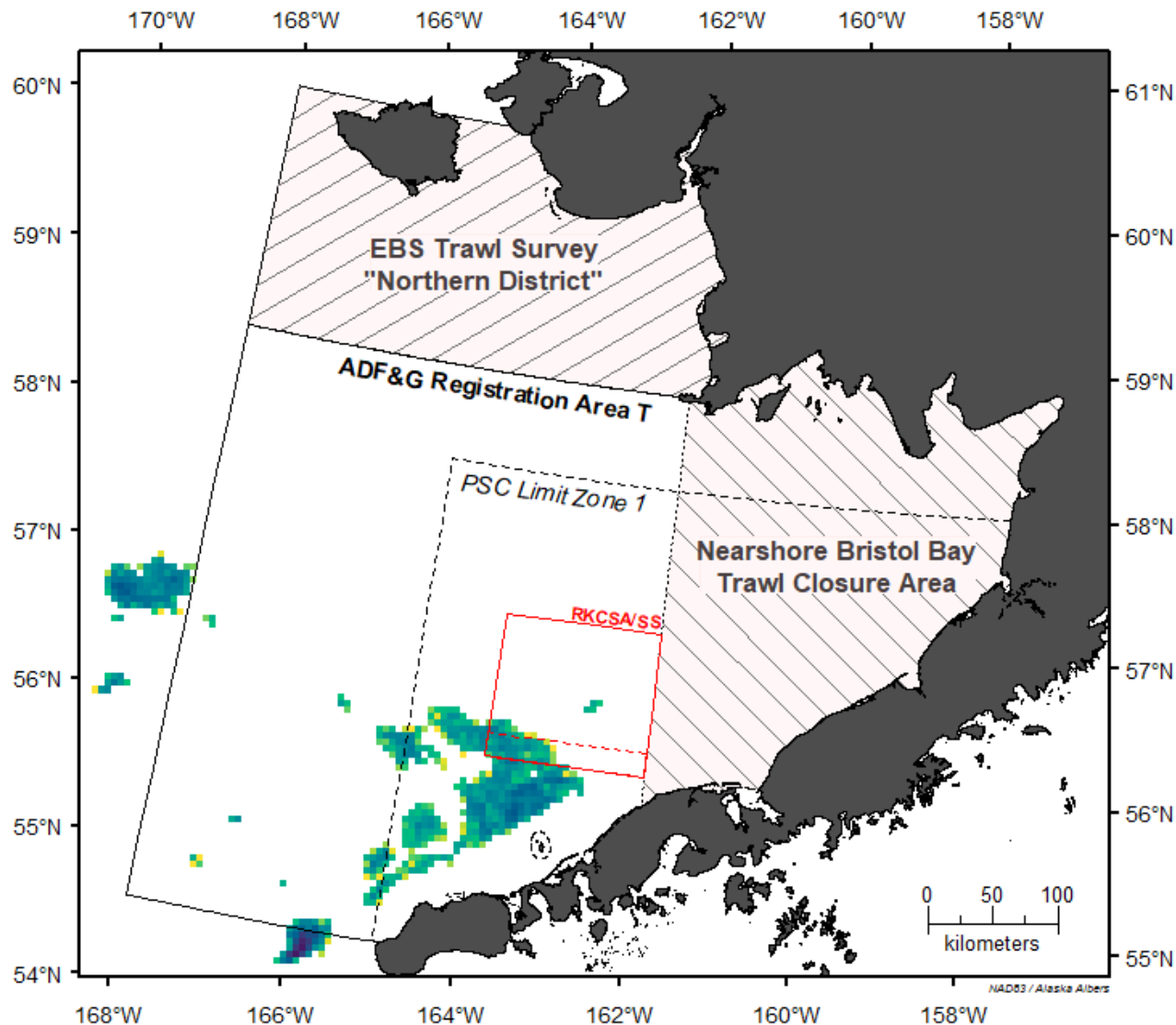
November 2015: Total Swept Area (SA), by PTR (0 km²)



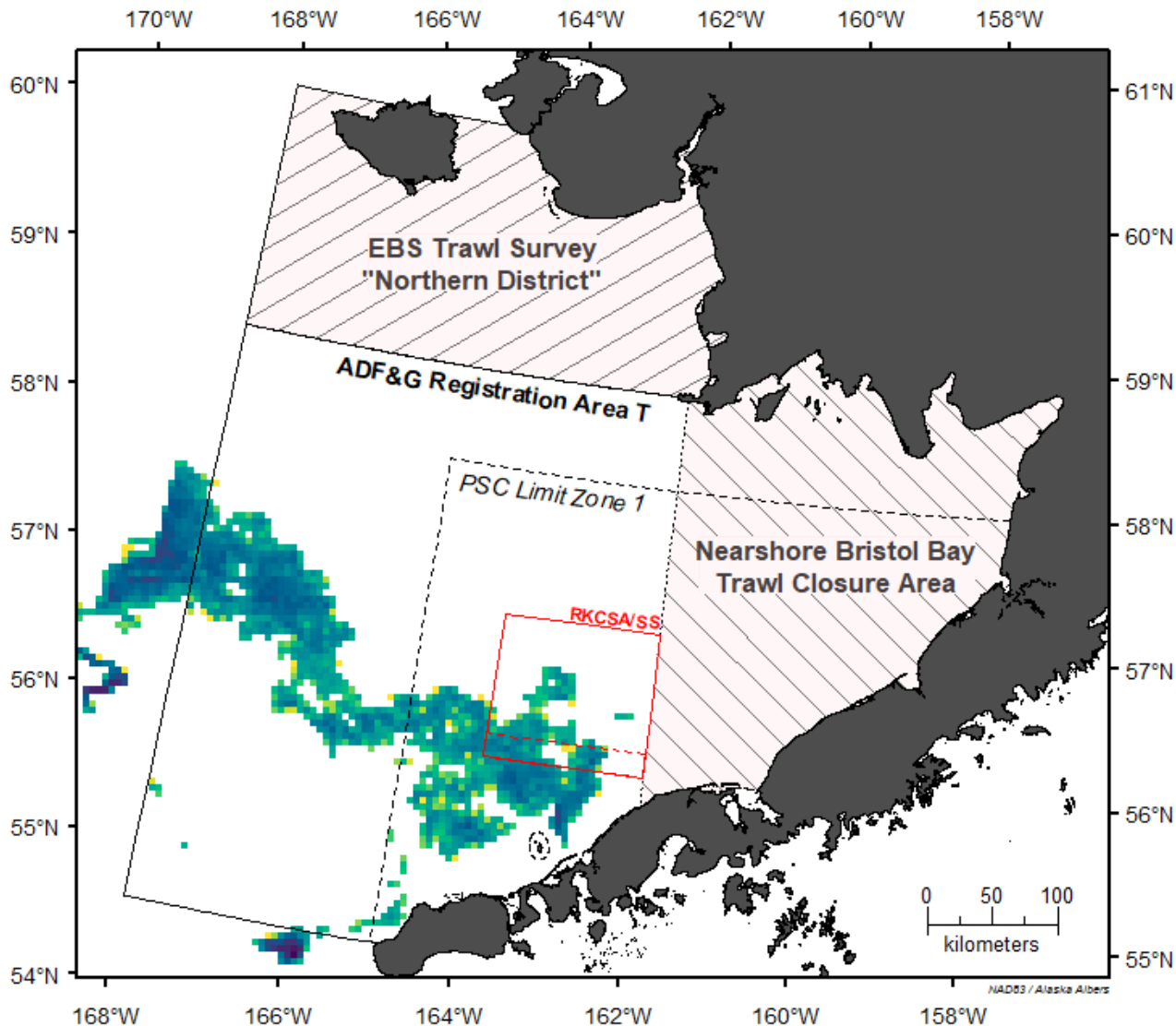
SA, km²



January 2016: Total Swept Area (SA), by PTR (1,242.2 km²)

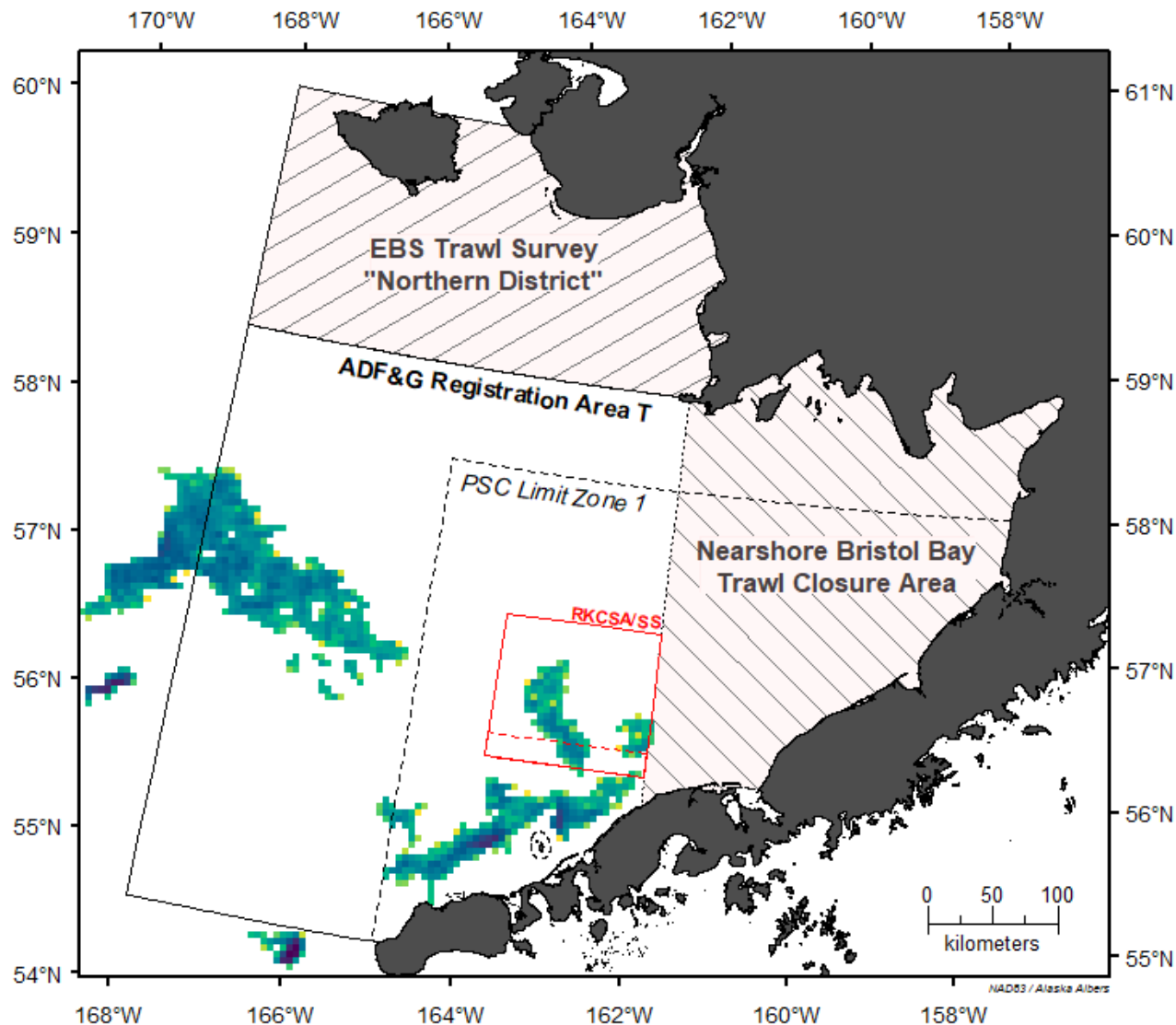


February 2016: Total Swept Area (SA), by PTR (3,615.3 km²)

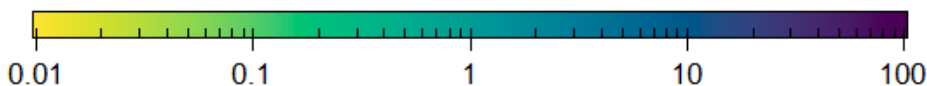


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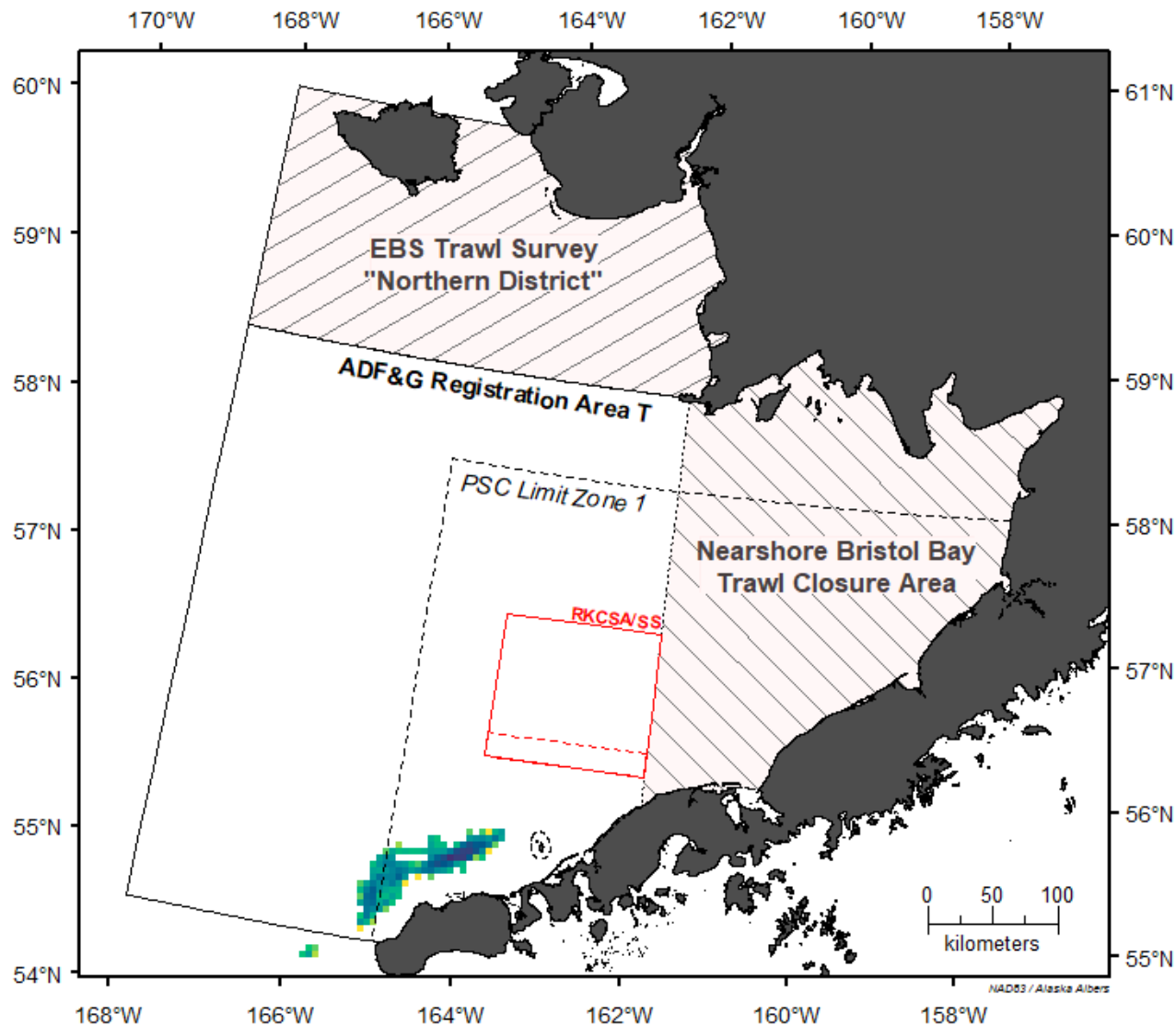
March 2016: Total Swept Area (SA), by PTR (2,528 km²)



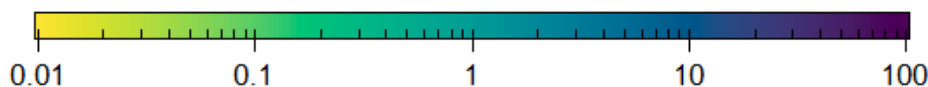
SA, km²



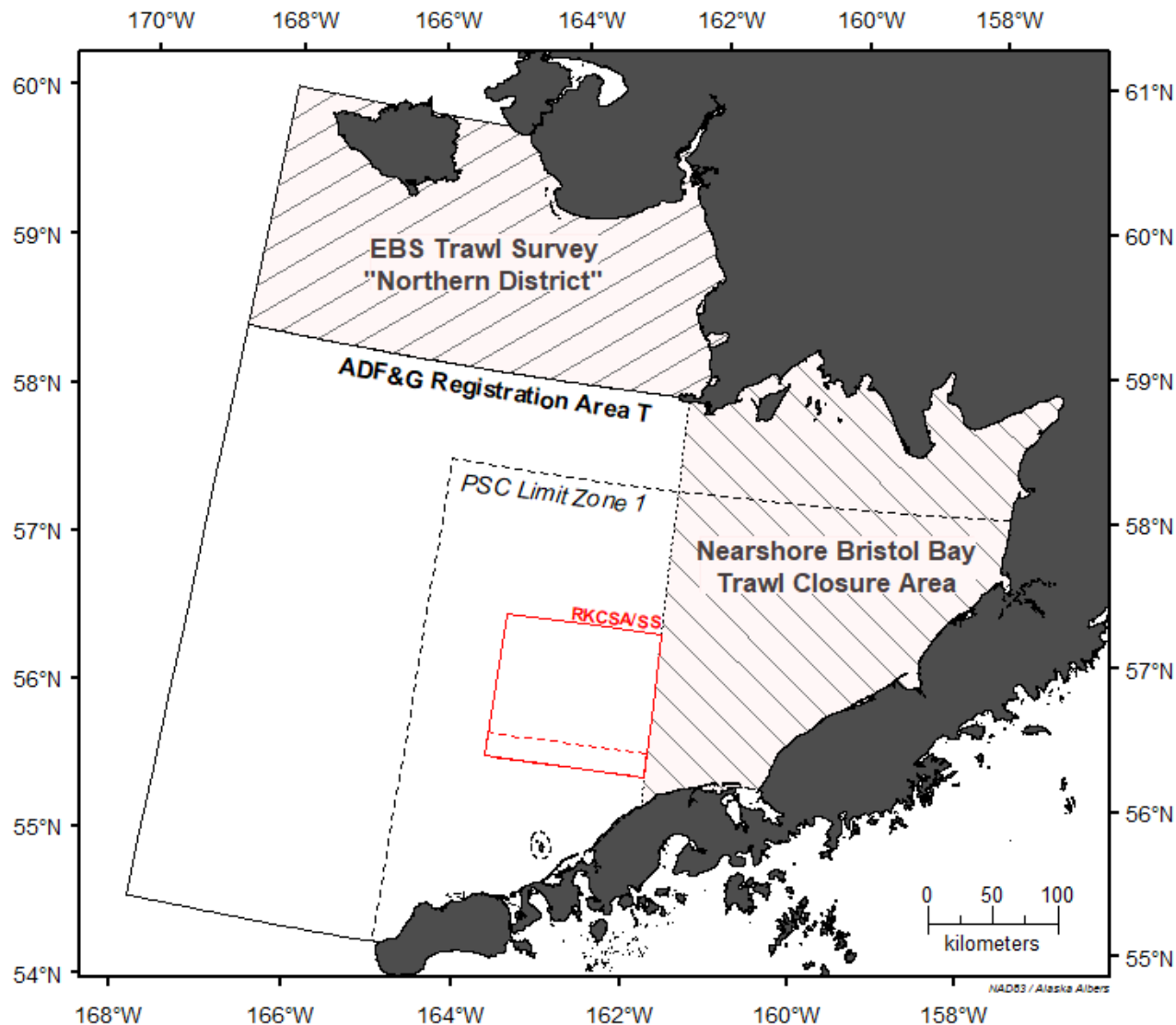
April 2016: Total Swept Area (SA), by PTR (773.2 km²)



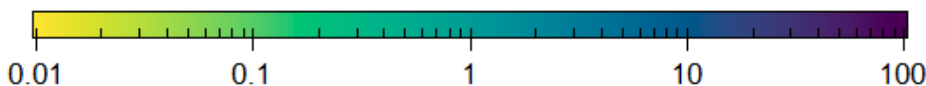
SA, km²



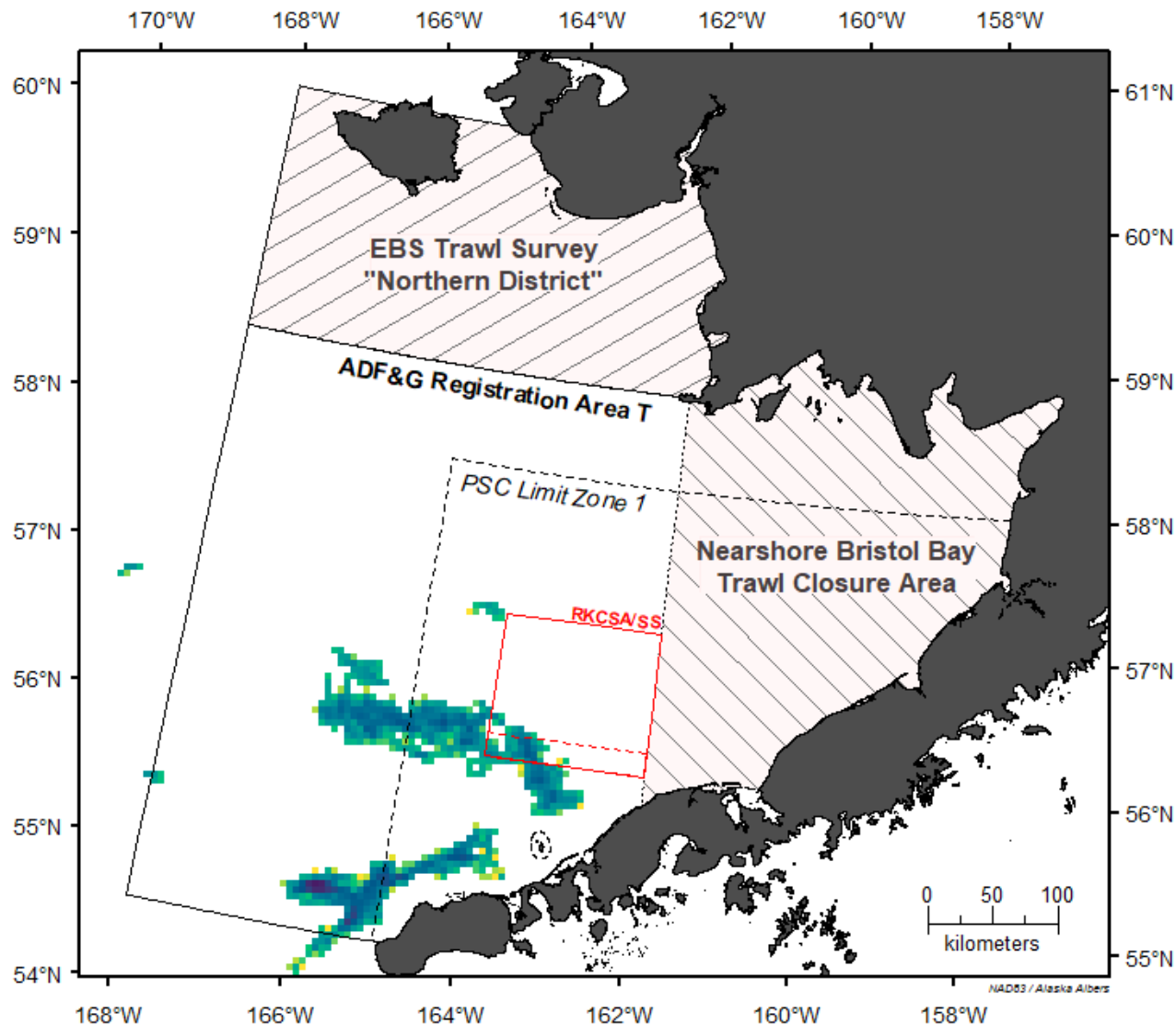
May 2016: Total Swept Area (SA), by PTR (0 km²)



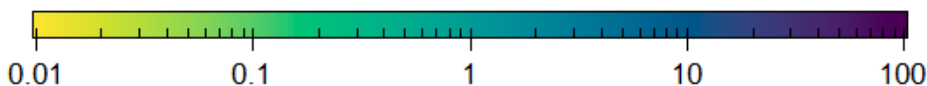
SA, km²



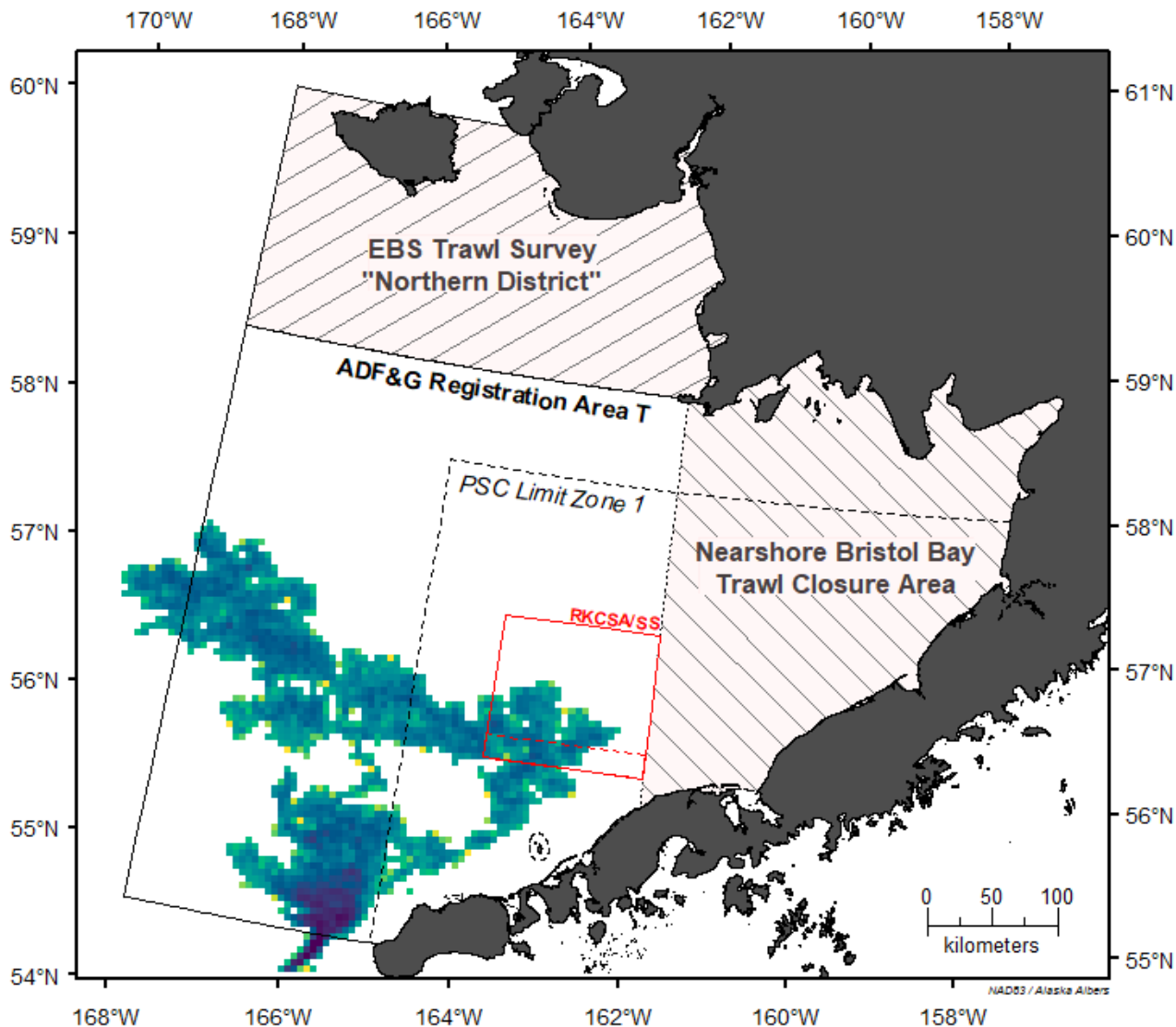
June 2016: Total Swept Area (SA), by PTR (2,662.4 km²)



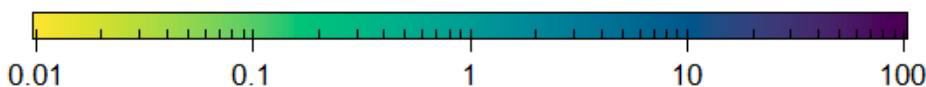
SA, km²



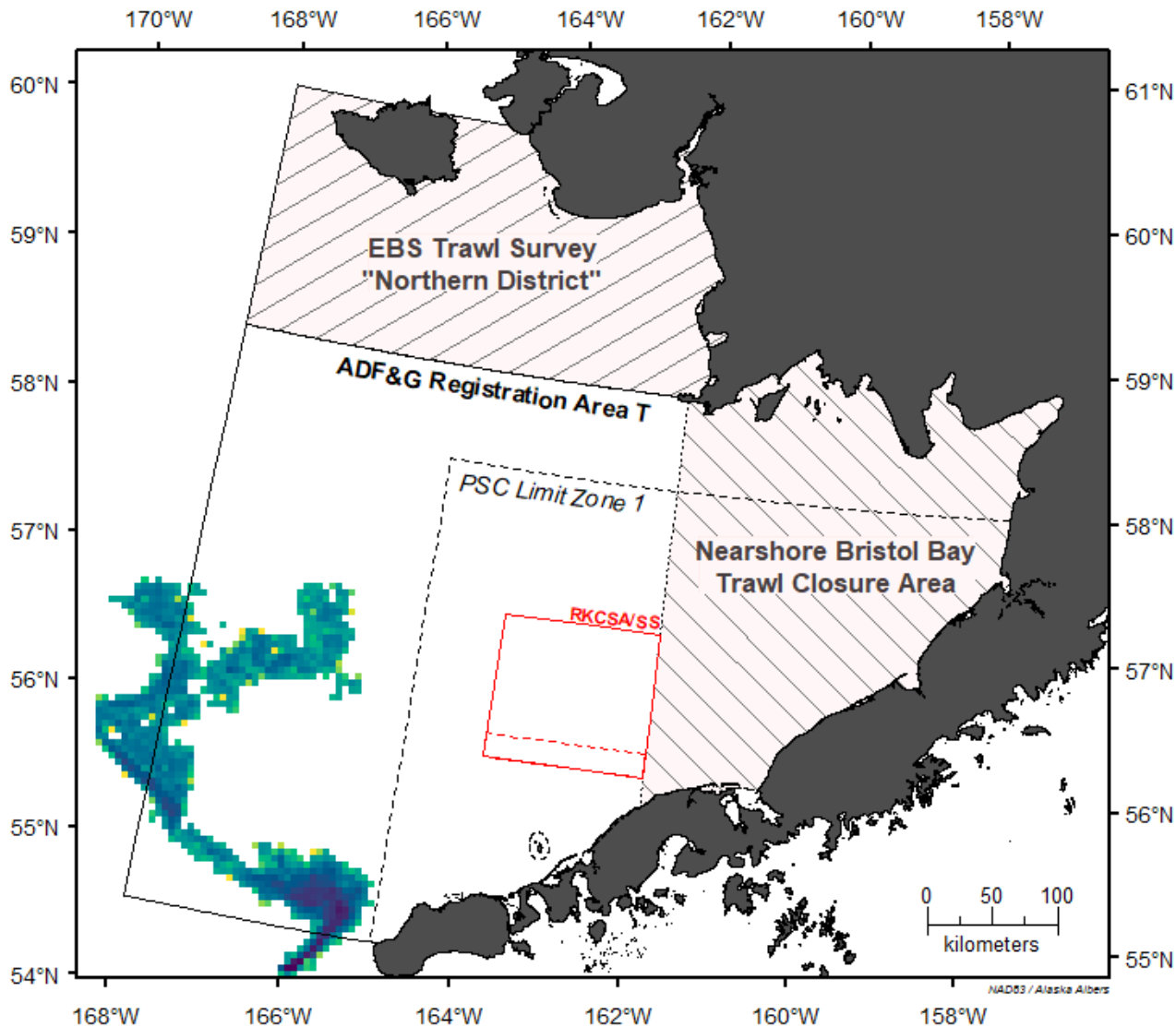
July 2016: Total Swept Area (SA), by PTR (9,261.3 km²)



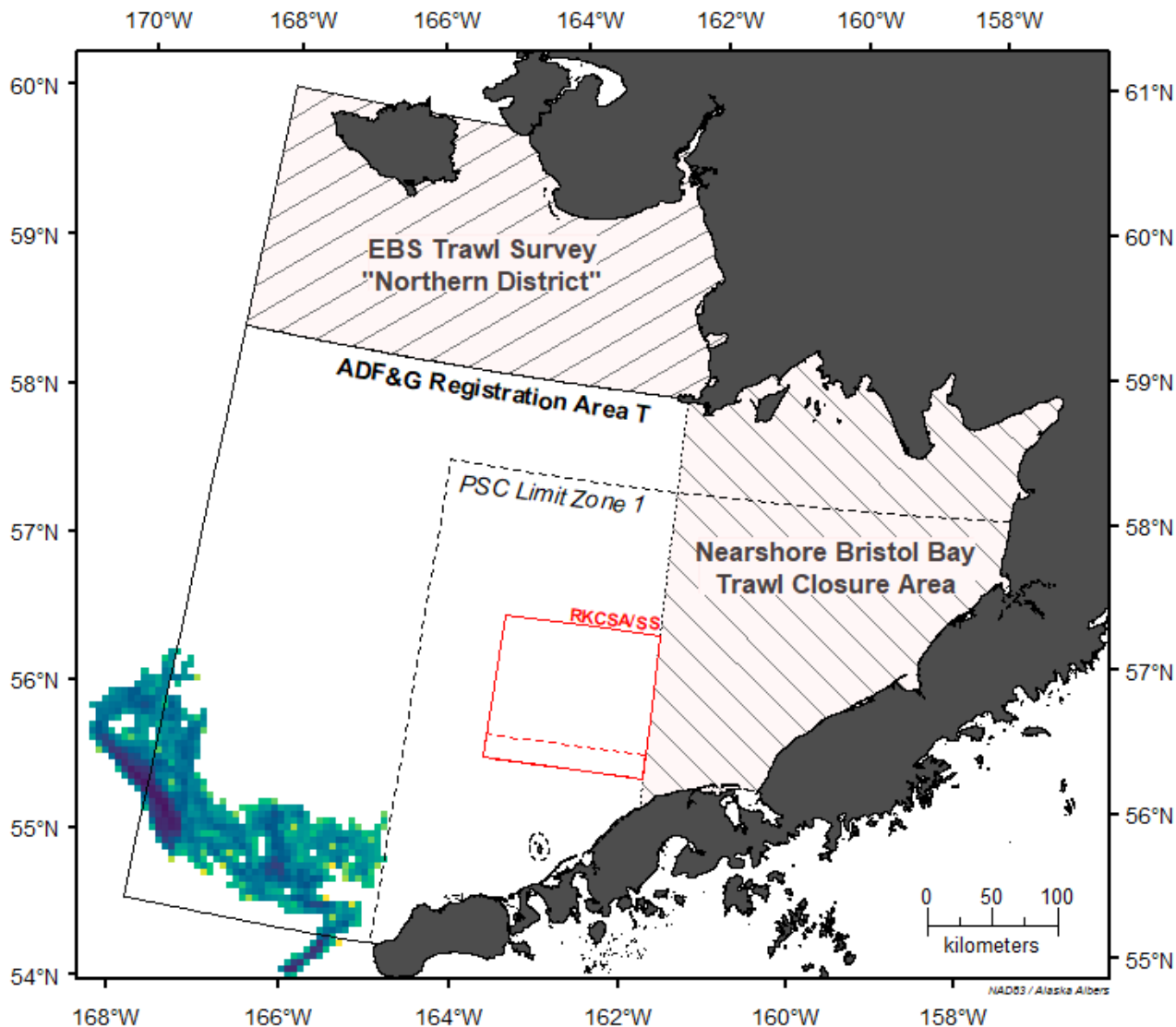
SA, km²



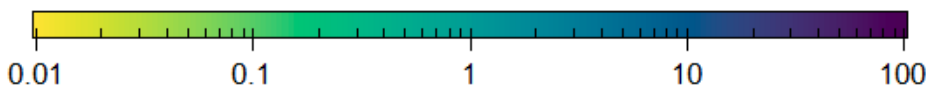
August 2016: Total Swept Area (SA), by PTR (2,969.2 km²)



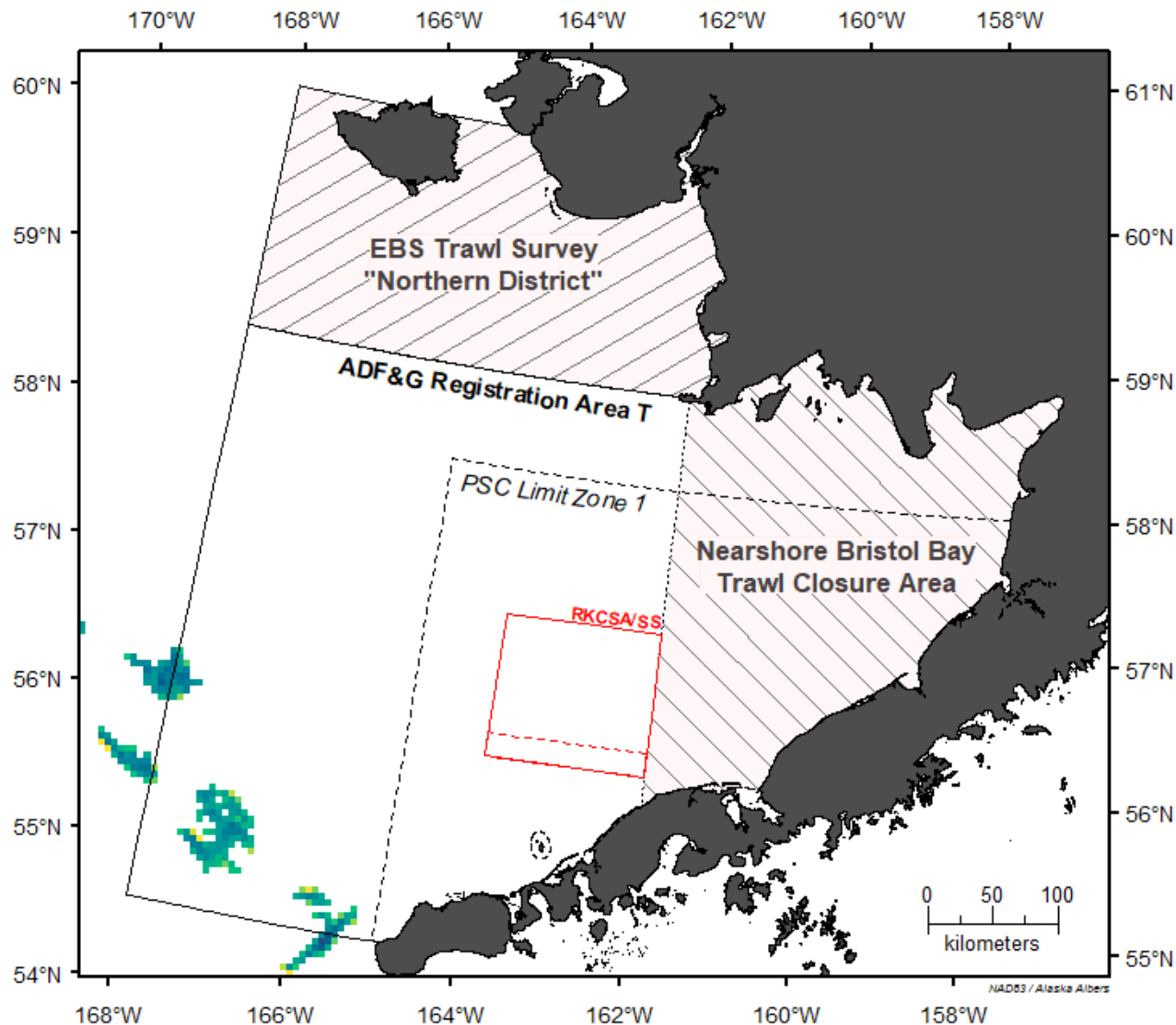
September 2016: Total Swept Area (SA), by PTR (2,981.6 km²)



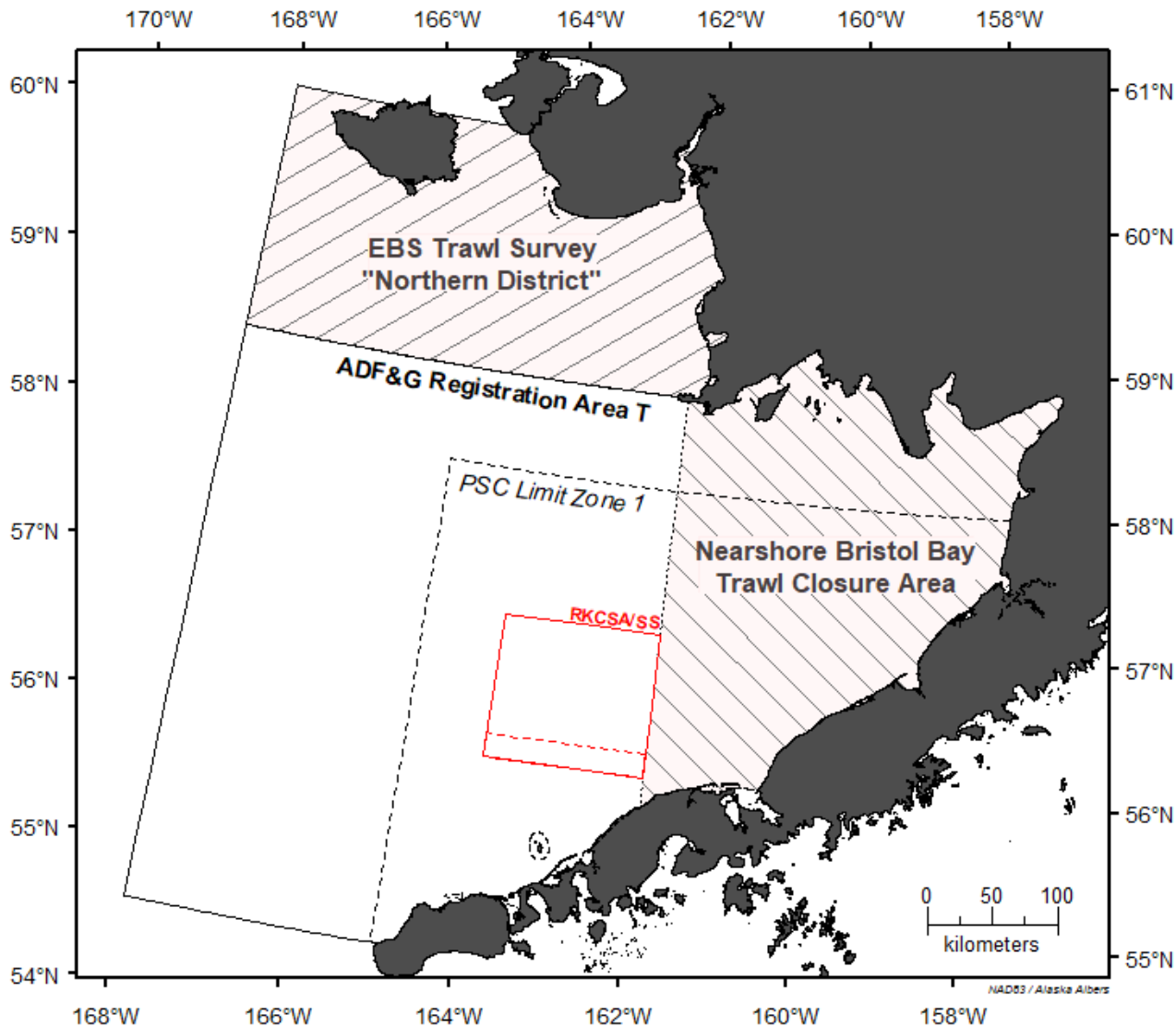
SA, km²



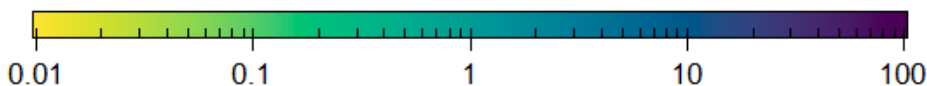
October 2016: Total Swept Area (SA), by PTR (196.2 km²)



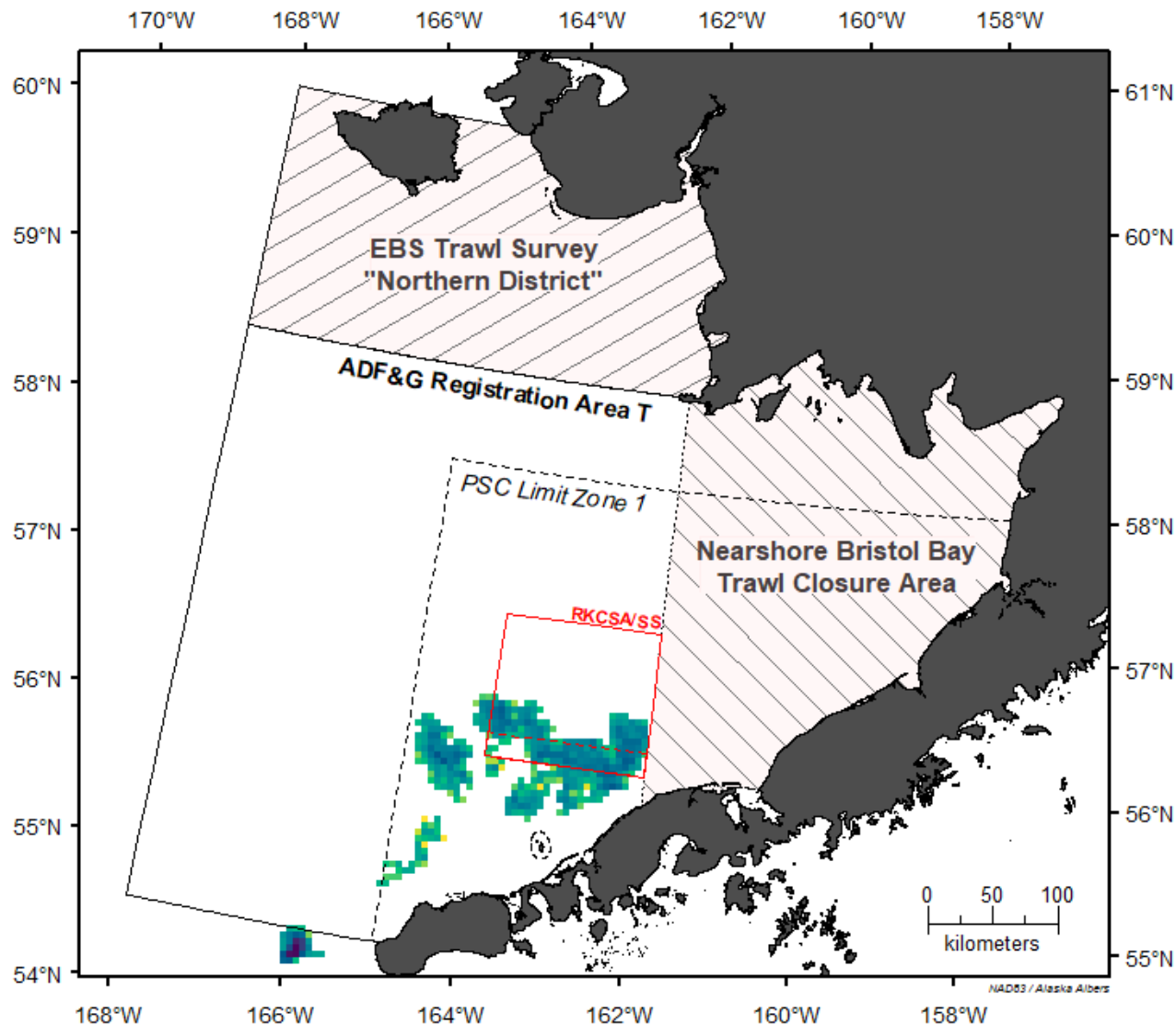
November 2016: Total Swept Area (SA), by PTR (0 km²)



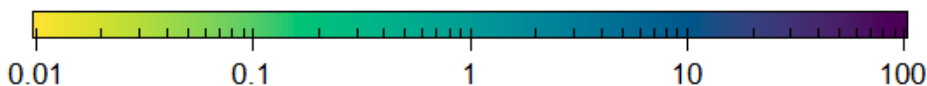
SA, km²



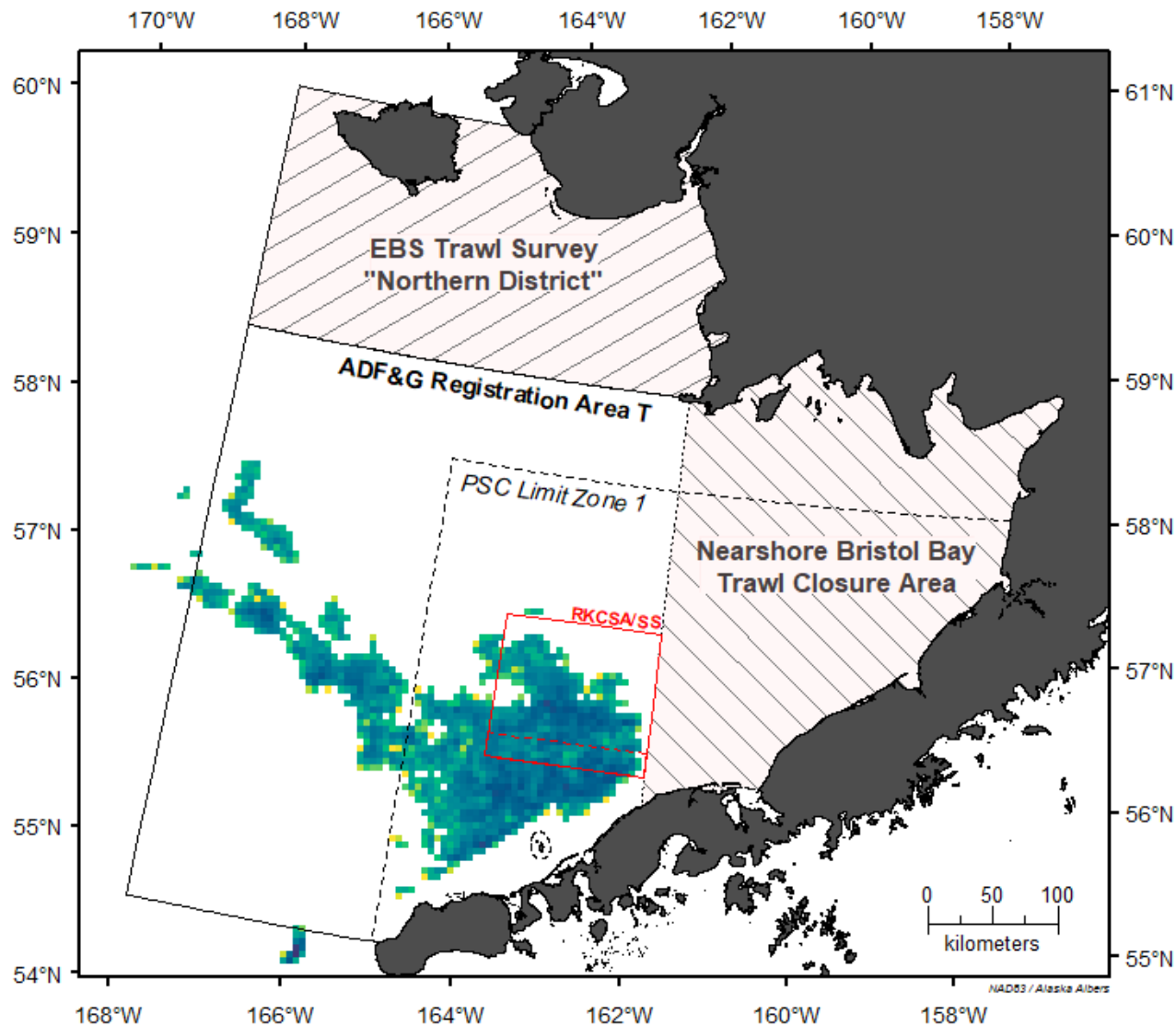
January 2017: Total Swept Area (SA), by PTR (2,087.4 km²)



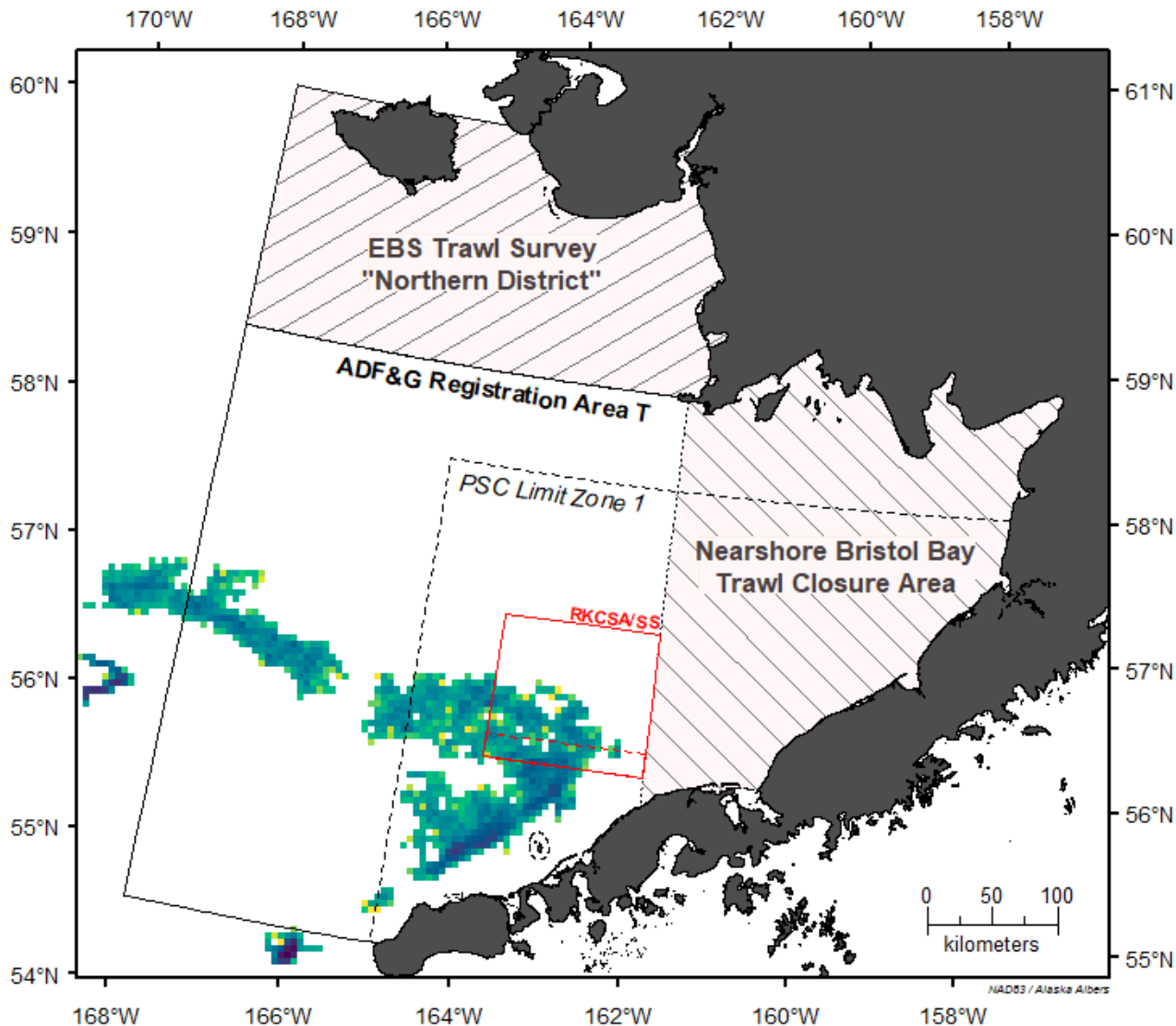
SA, km²



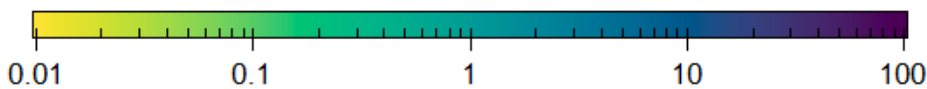
February 2017: Total Swept Area (SA), by PTR (7,630.2 km²)



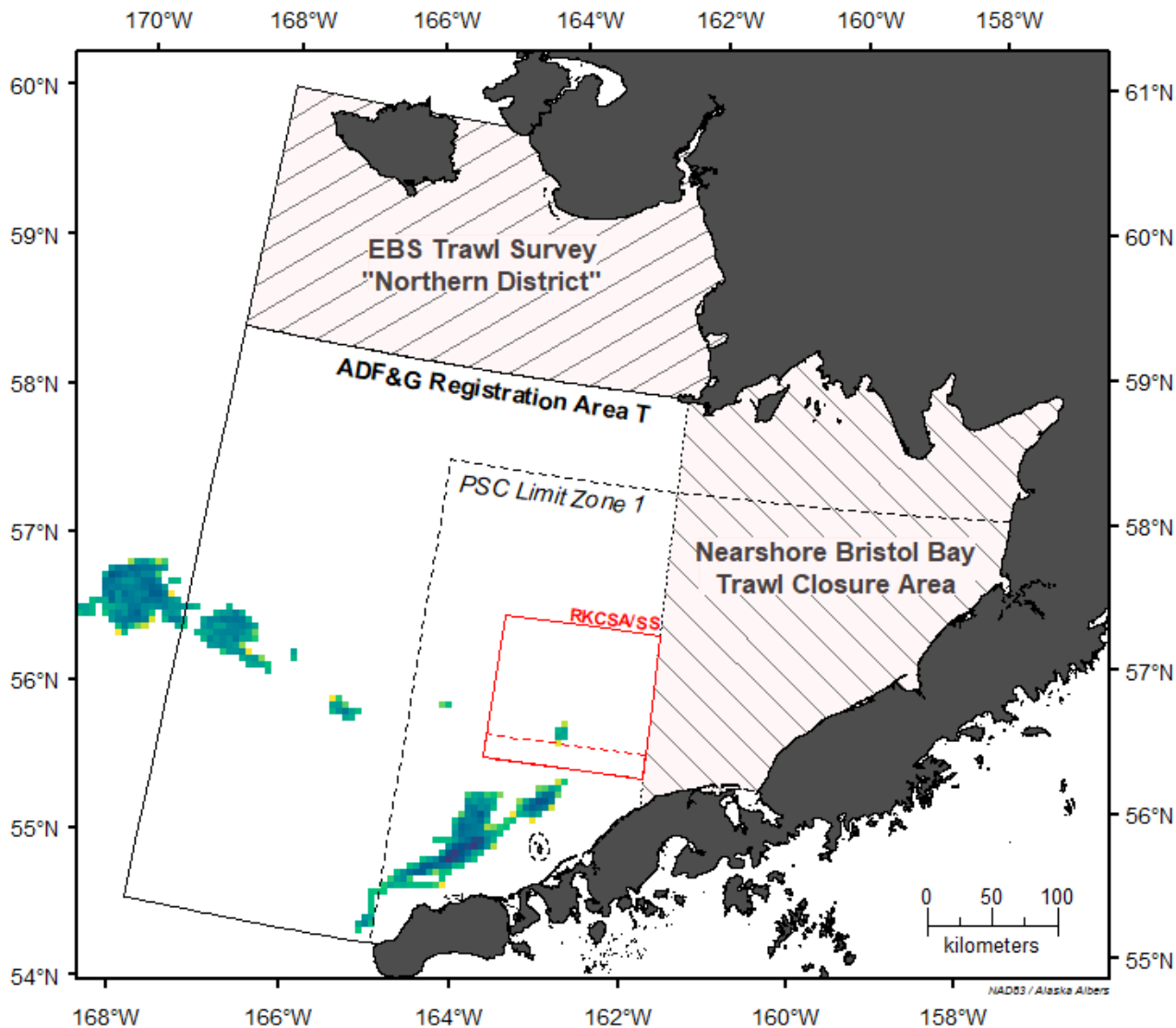
March 2017: Total Swept Area (SA), by PTR (3,598.8 km²)



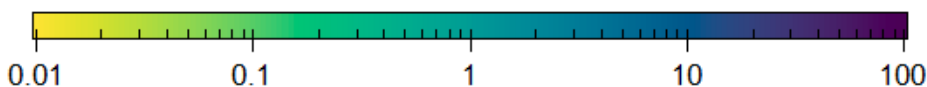
SA, km²



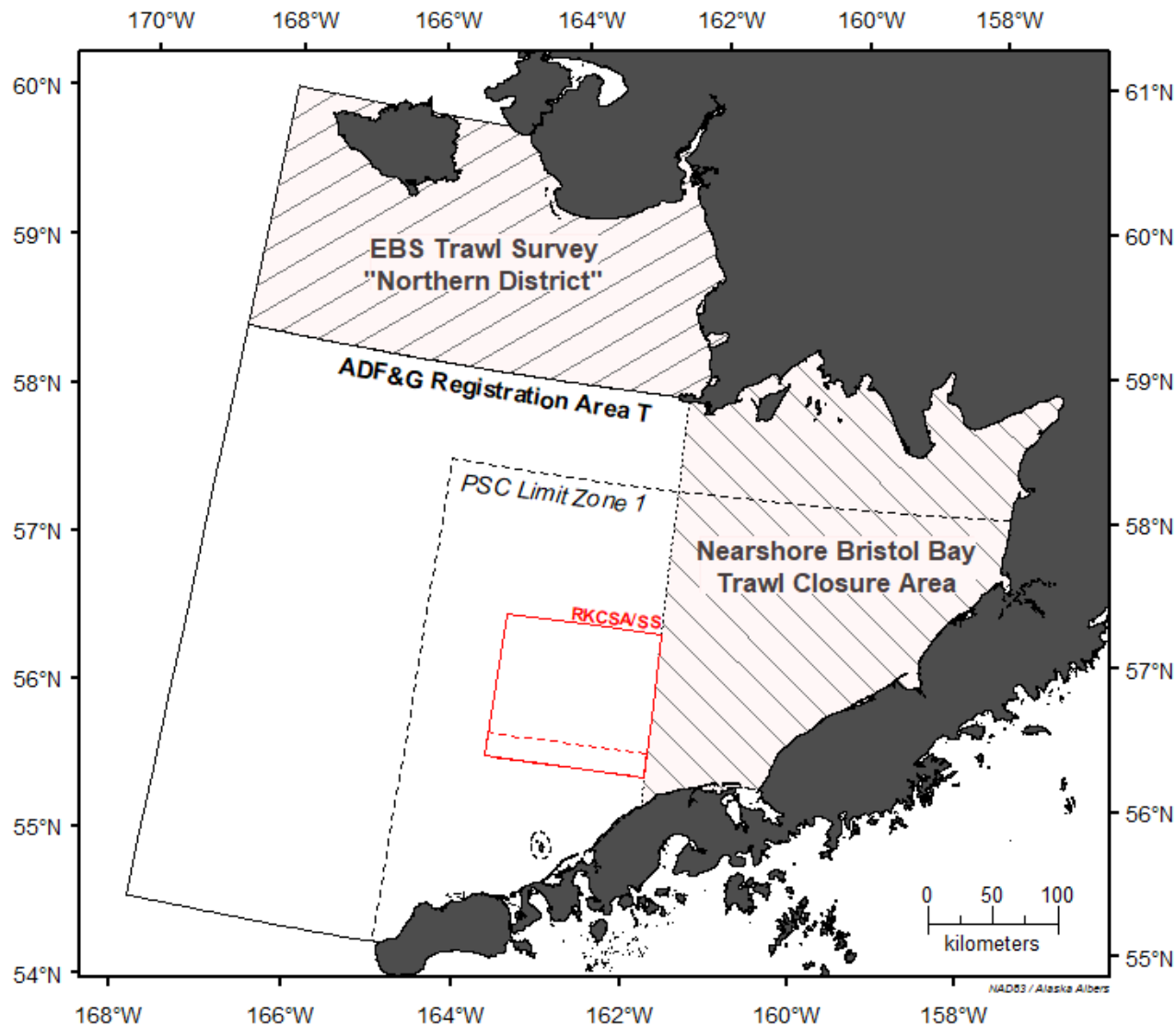
April 2017: Total Swept Area (SA), by PTR (1,008.6 km²)



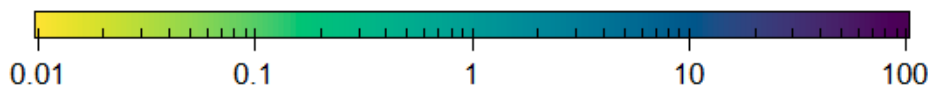
SA, km²



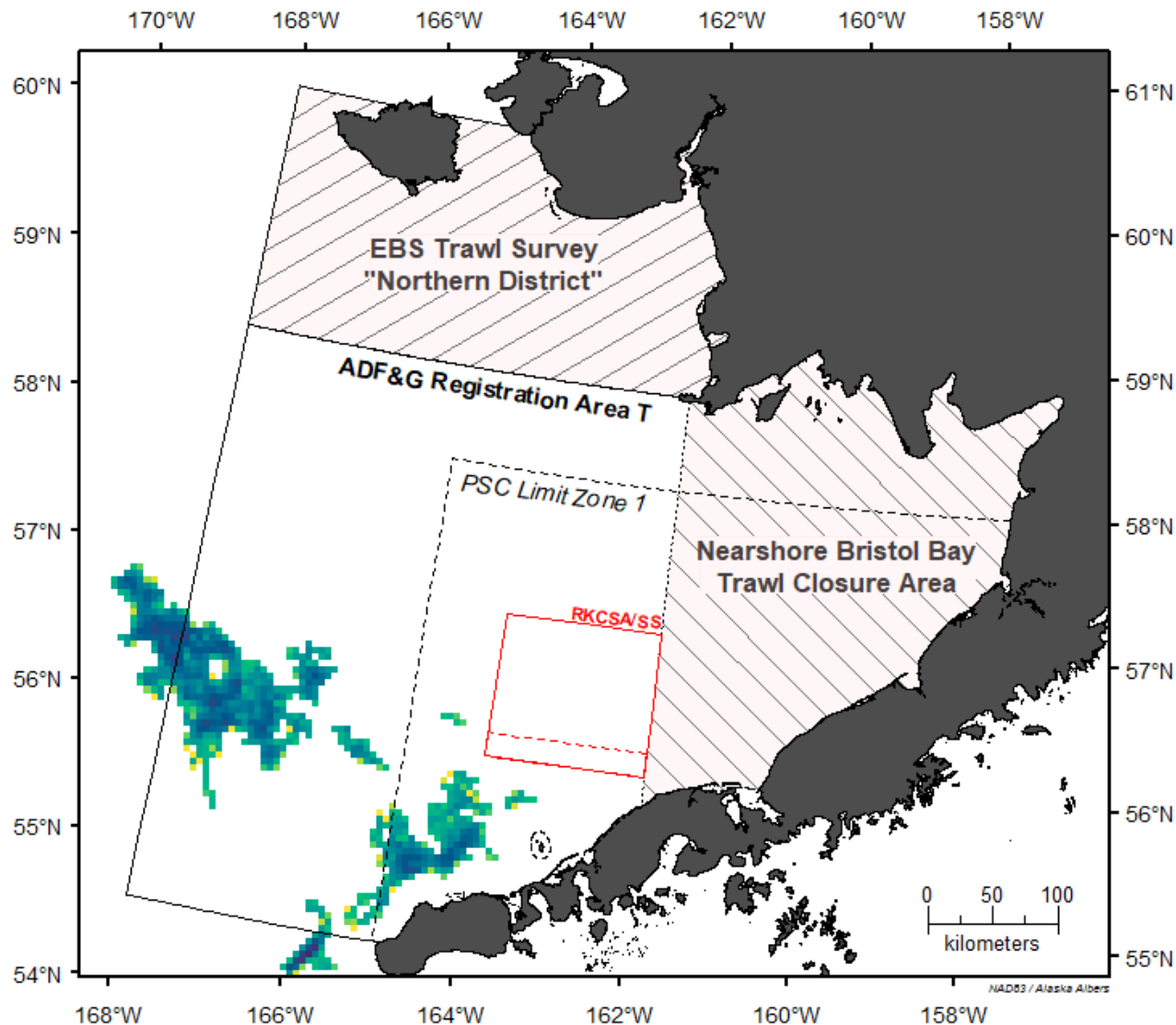
May 2017: Total Swept Area (SA), by PTR (0 km²)



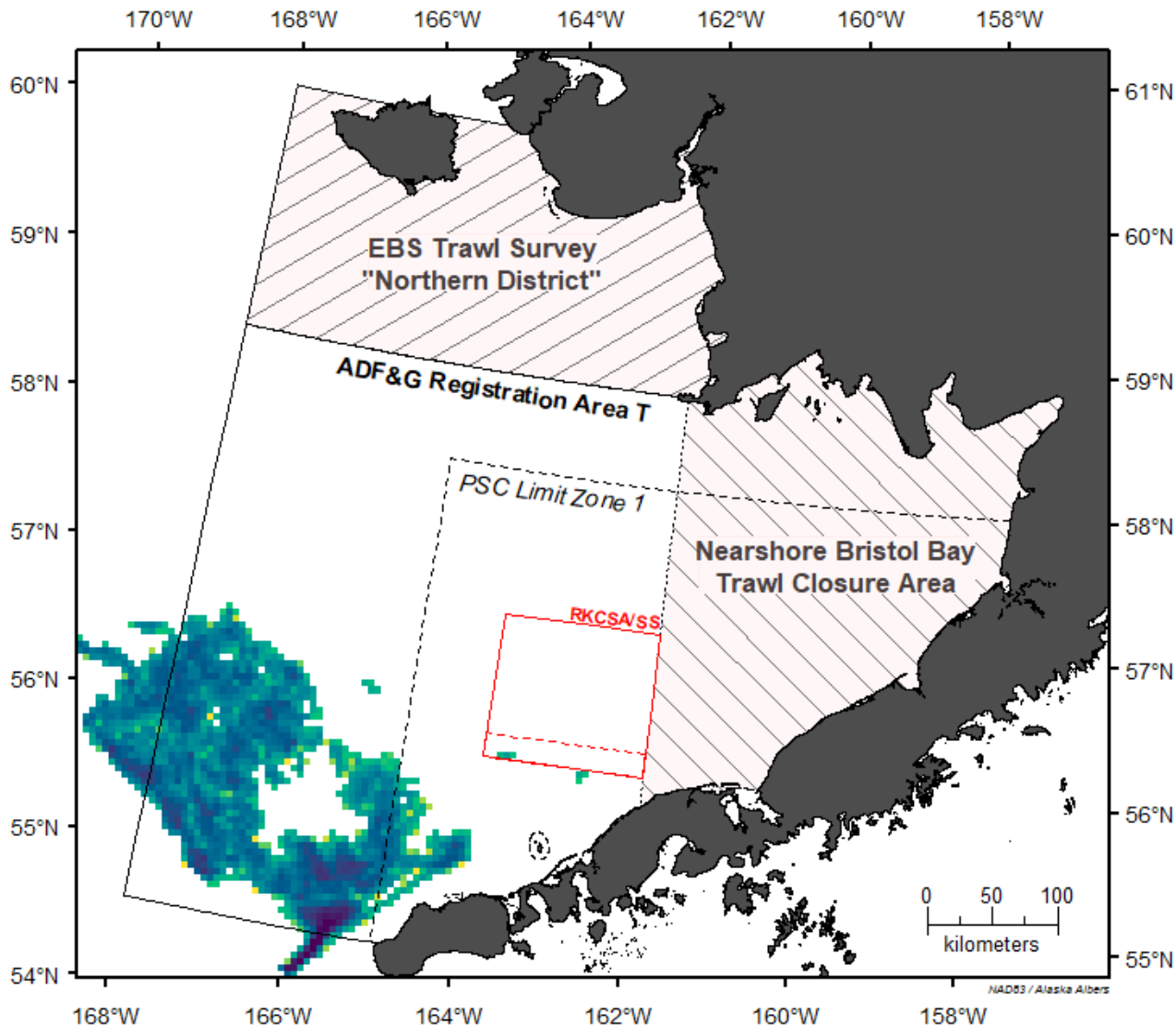
SA, km²



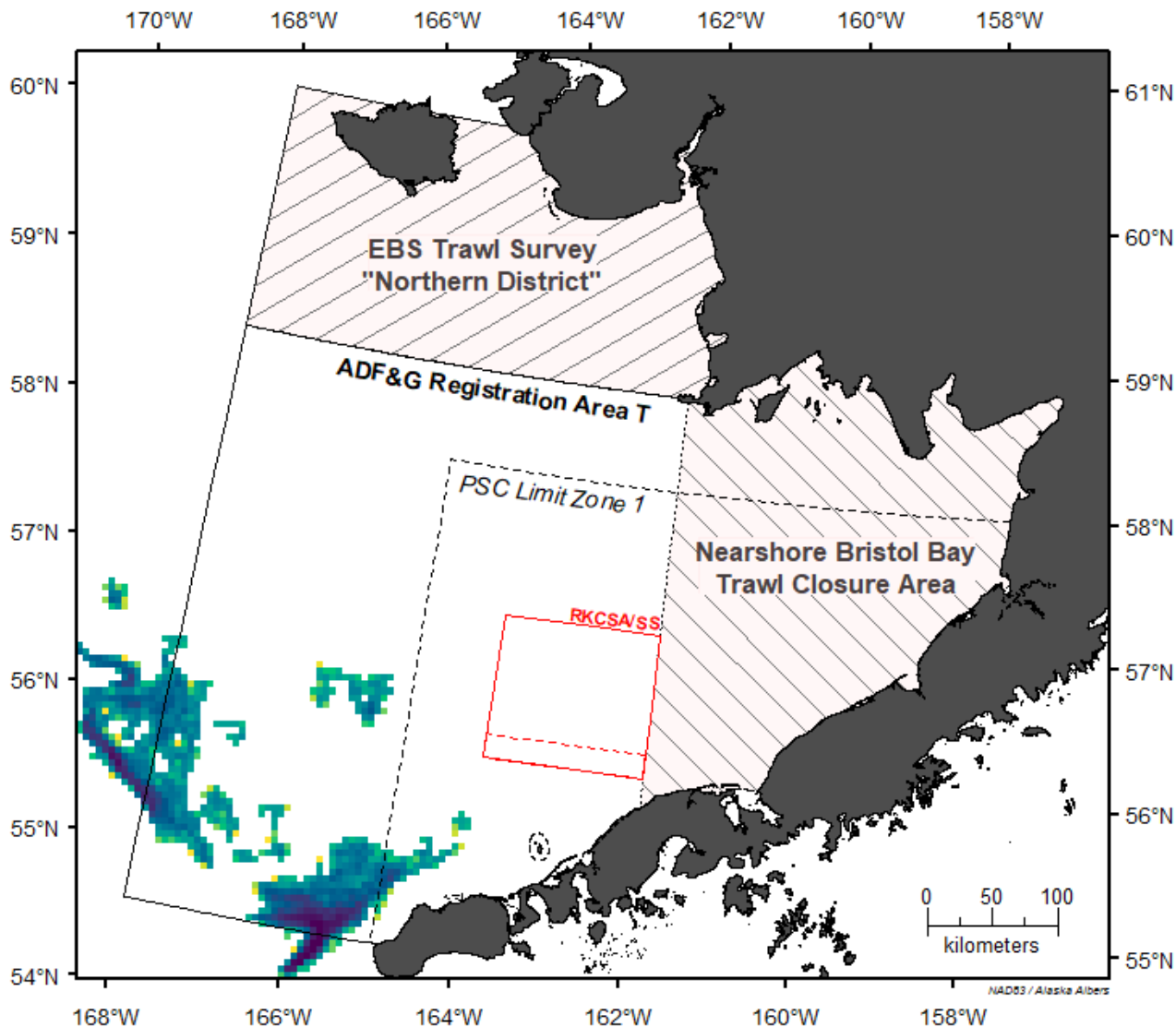
June 2017: Total Swept Area (SA), by PTR (2,032.1 km²)



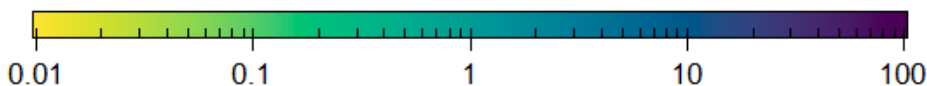
July 2017: Total Swept Area (SA), by PTR (7,072.1 km²)



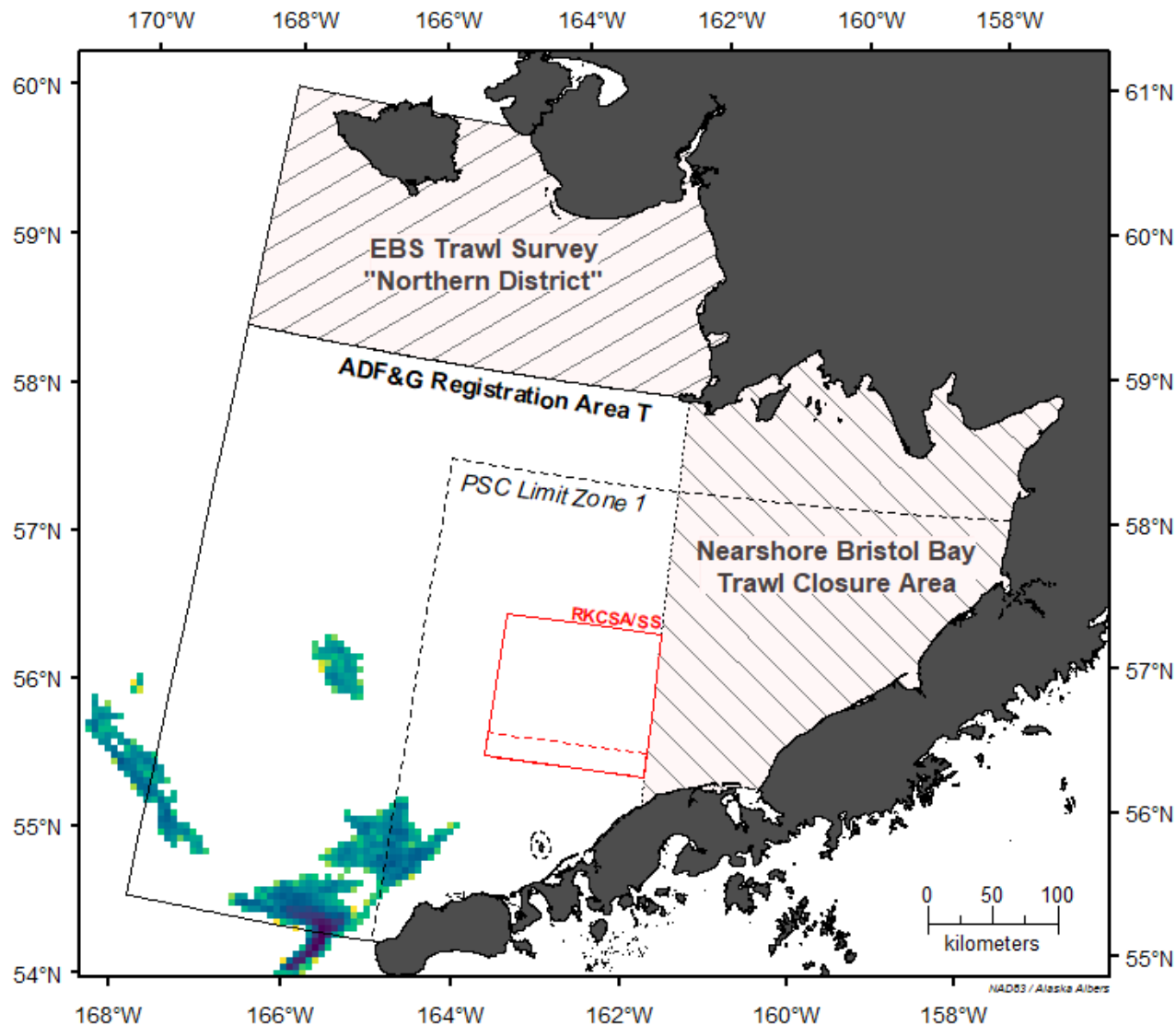
August 2017: Total Swept Area (SA), by PTR (4,173.2 km²)



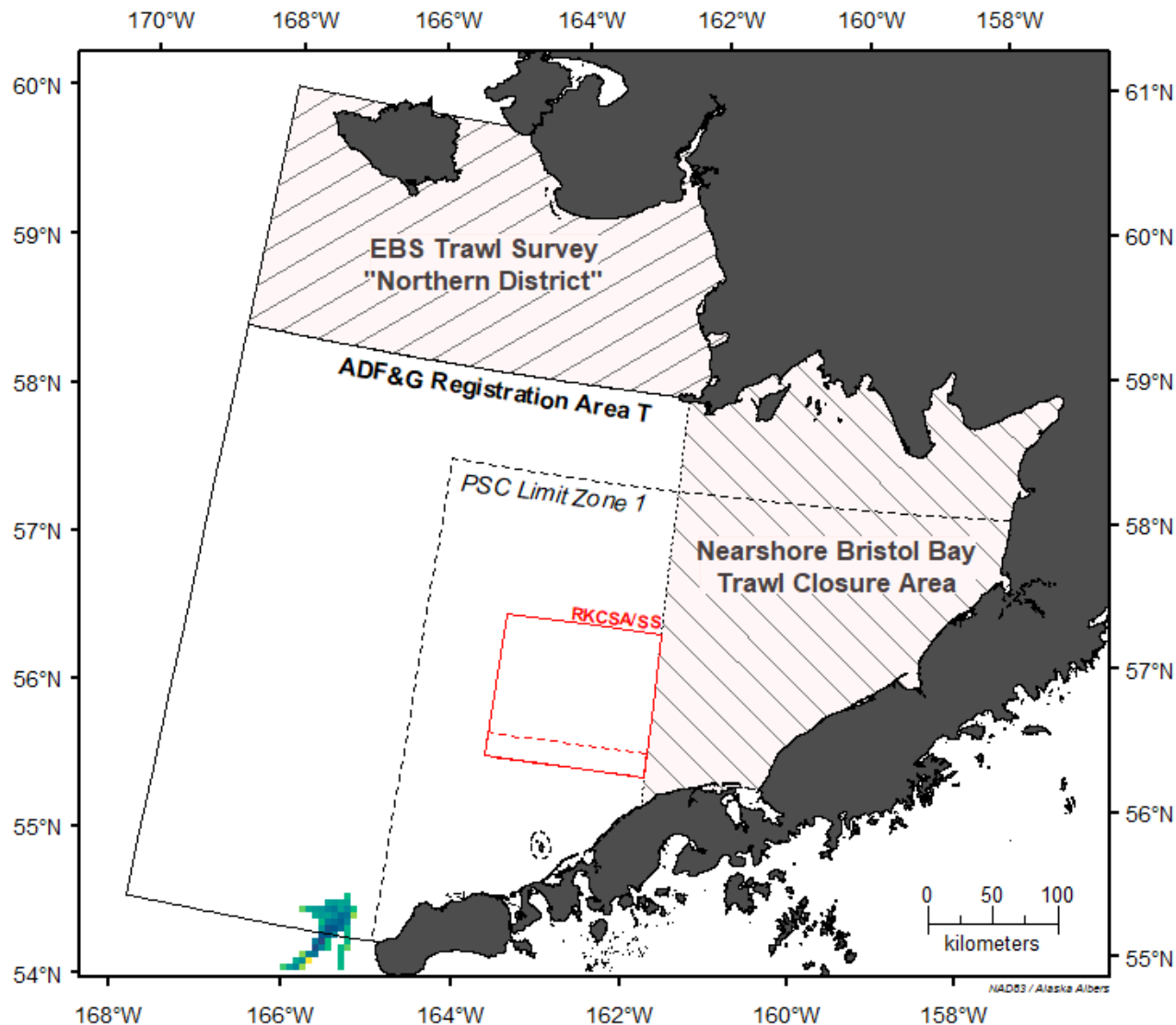
SA, km²



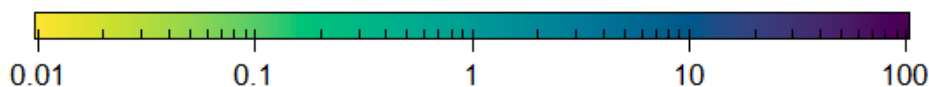
September 2017: Total Swept Area (SA), by PTR (1,891.9 km²)



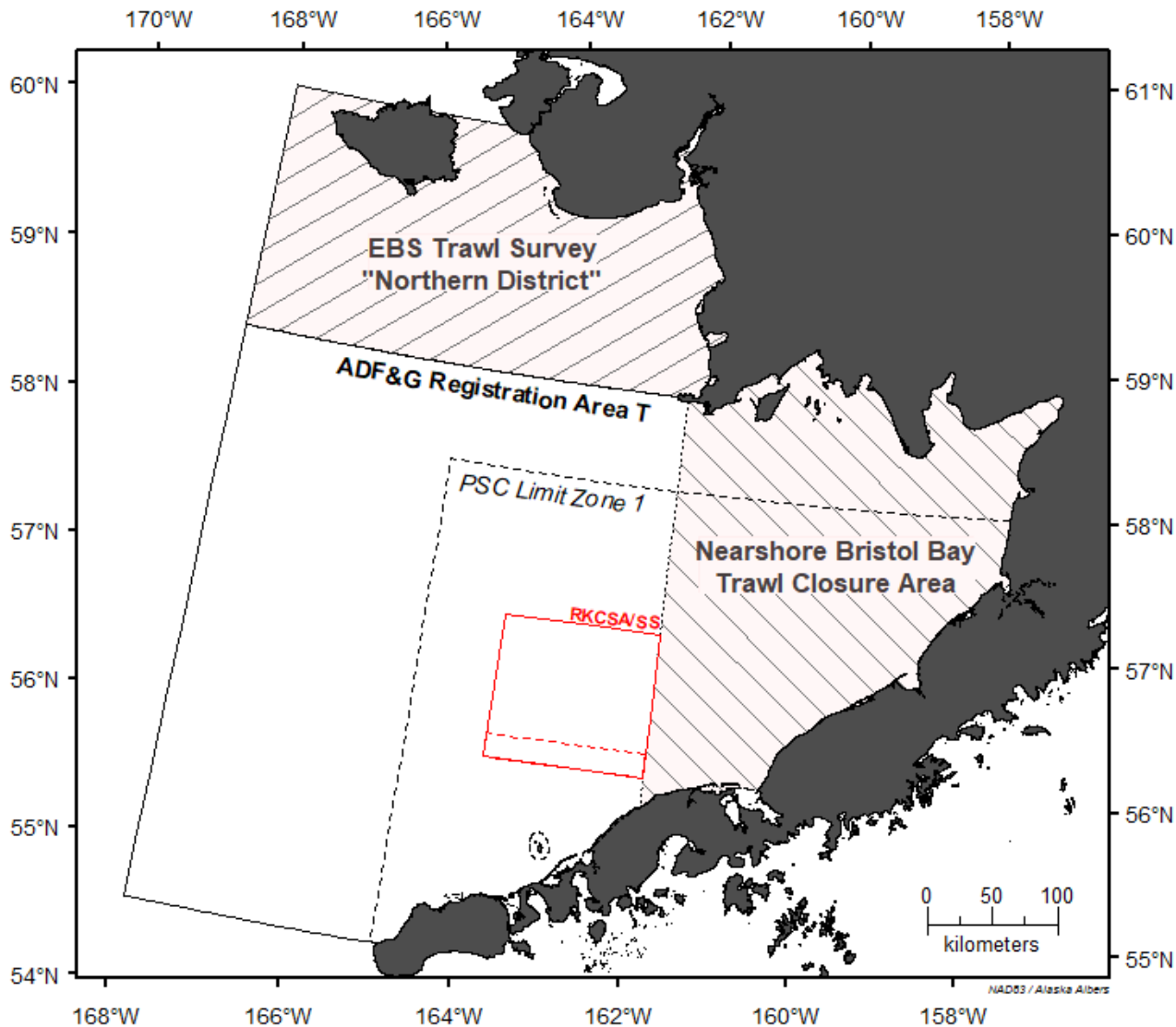
October 2017: Total Swept Area (SA), by PTR (100.9 km²)



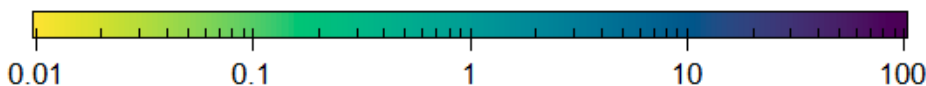
SA, km²



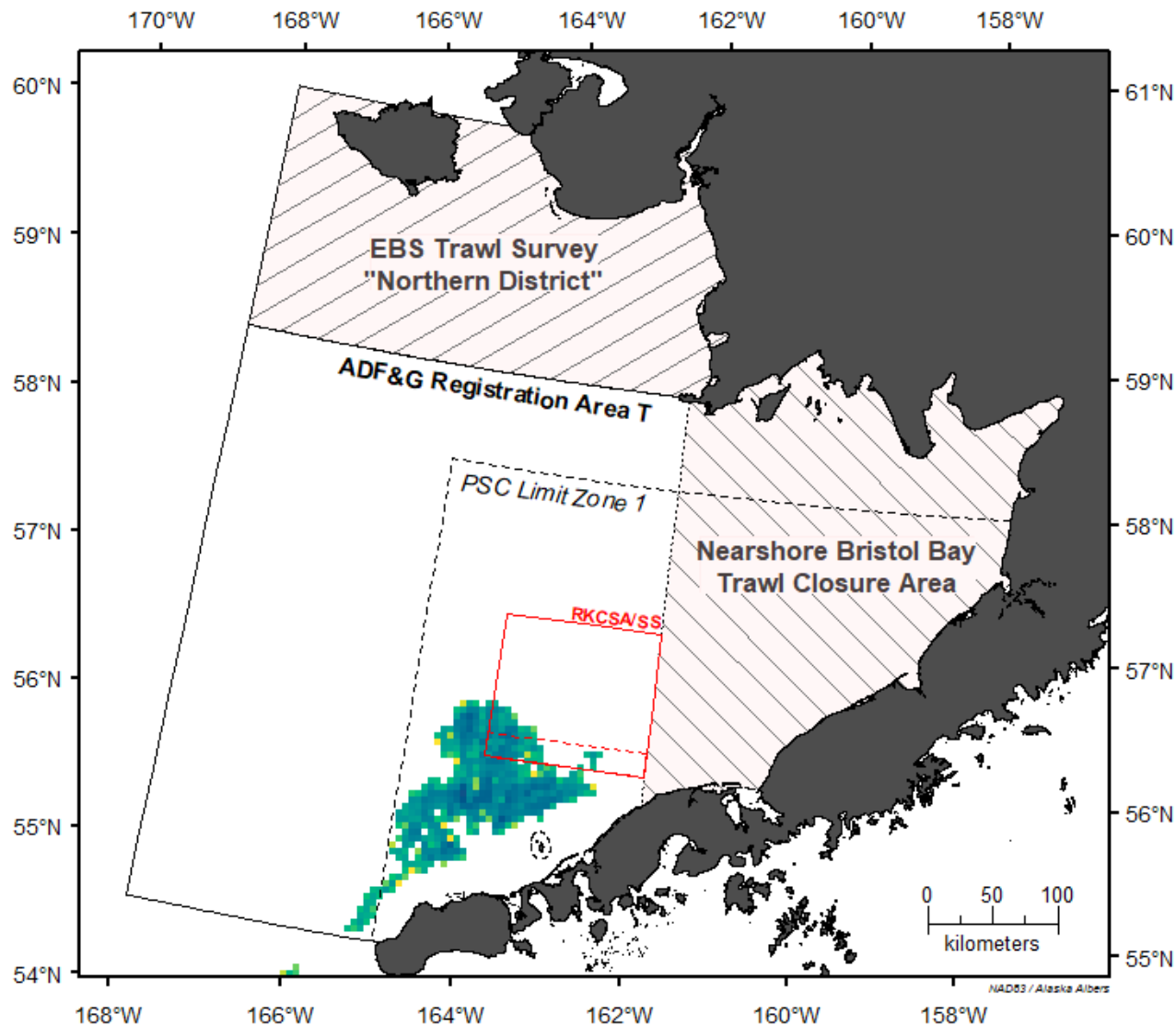
November 2017: Total Swept Area (SA), by PTR (0 km²)



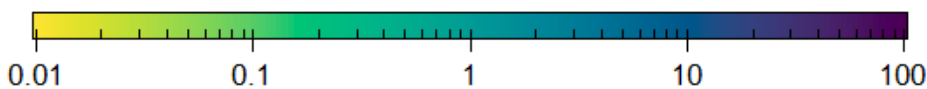
SA, km²



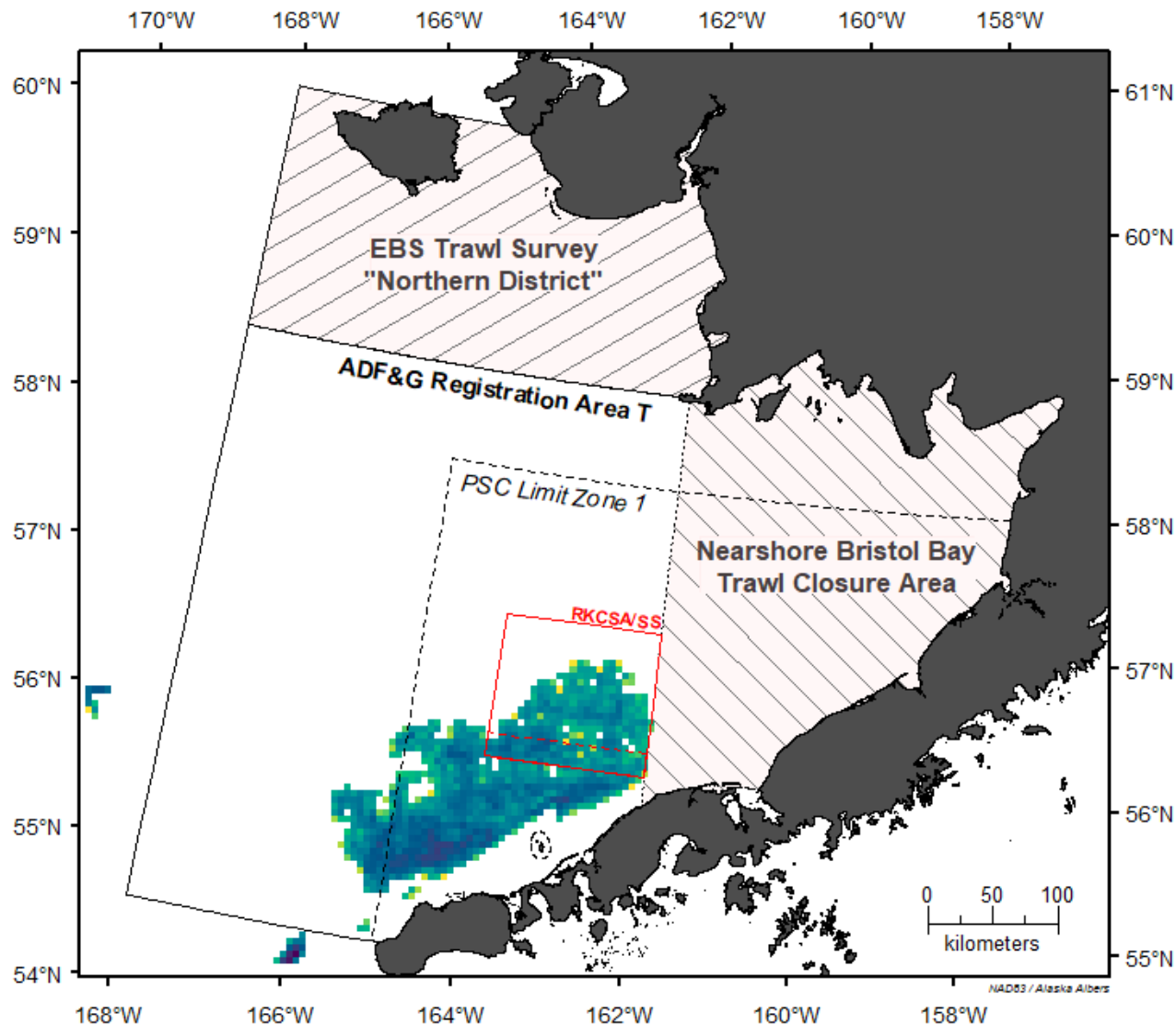
January 2018: Total Swept Area (SA), by PTR (1,827.9 km²)



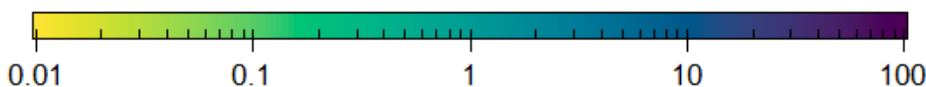
SA, km²



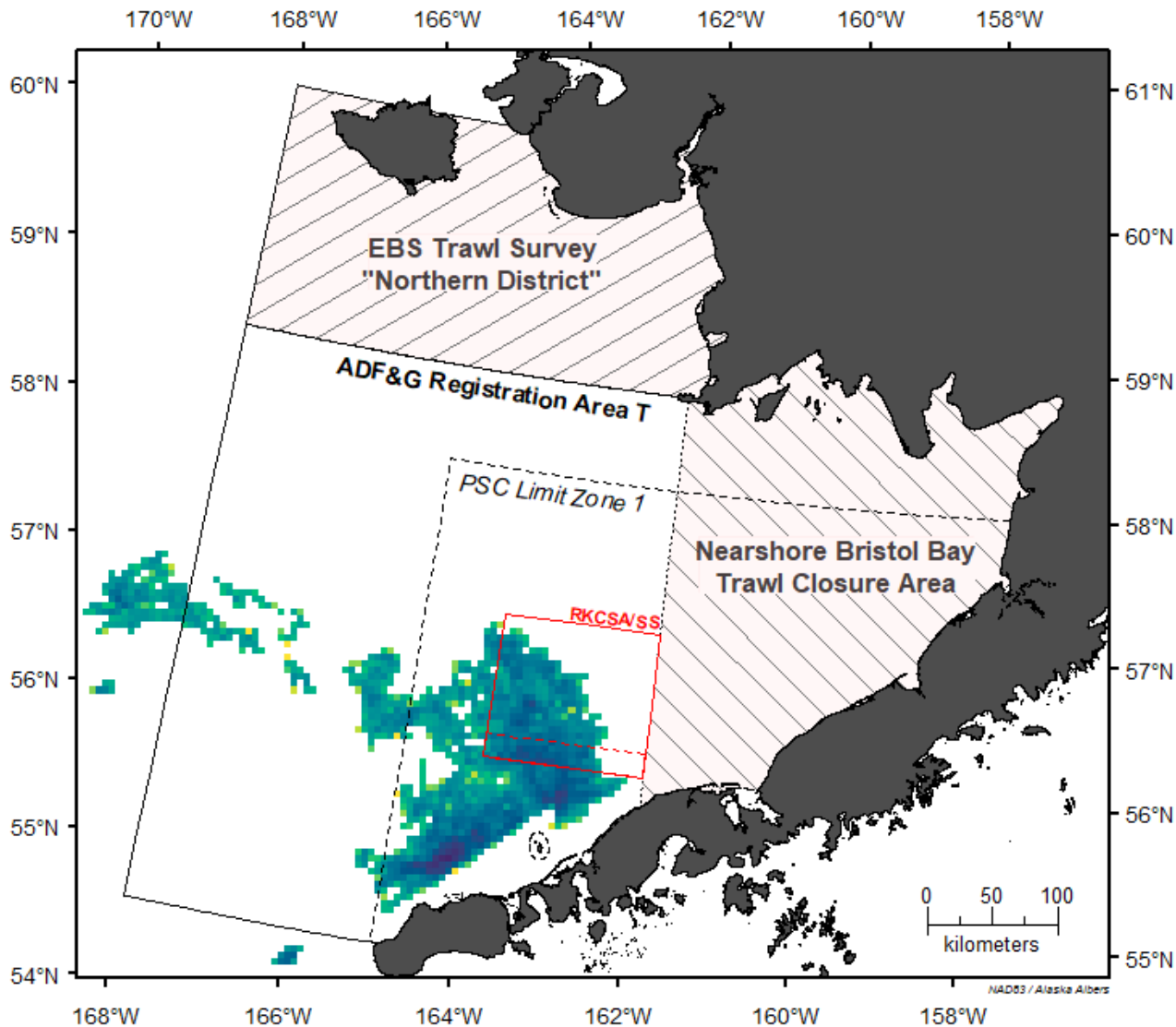
February 2018: Total Swept Area (SA), by PTR (6,917 km²)



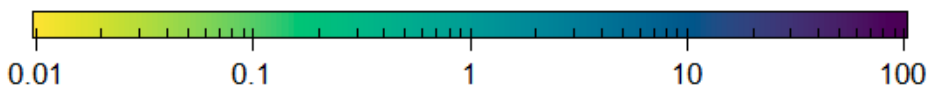
SA, km²



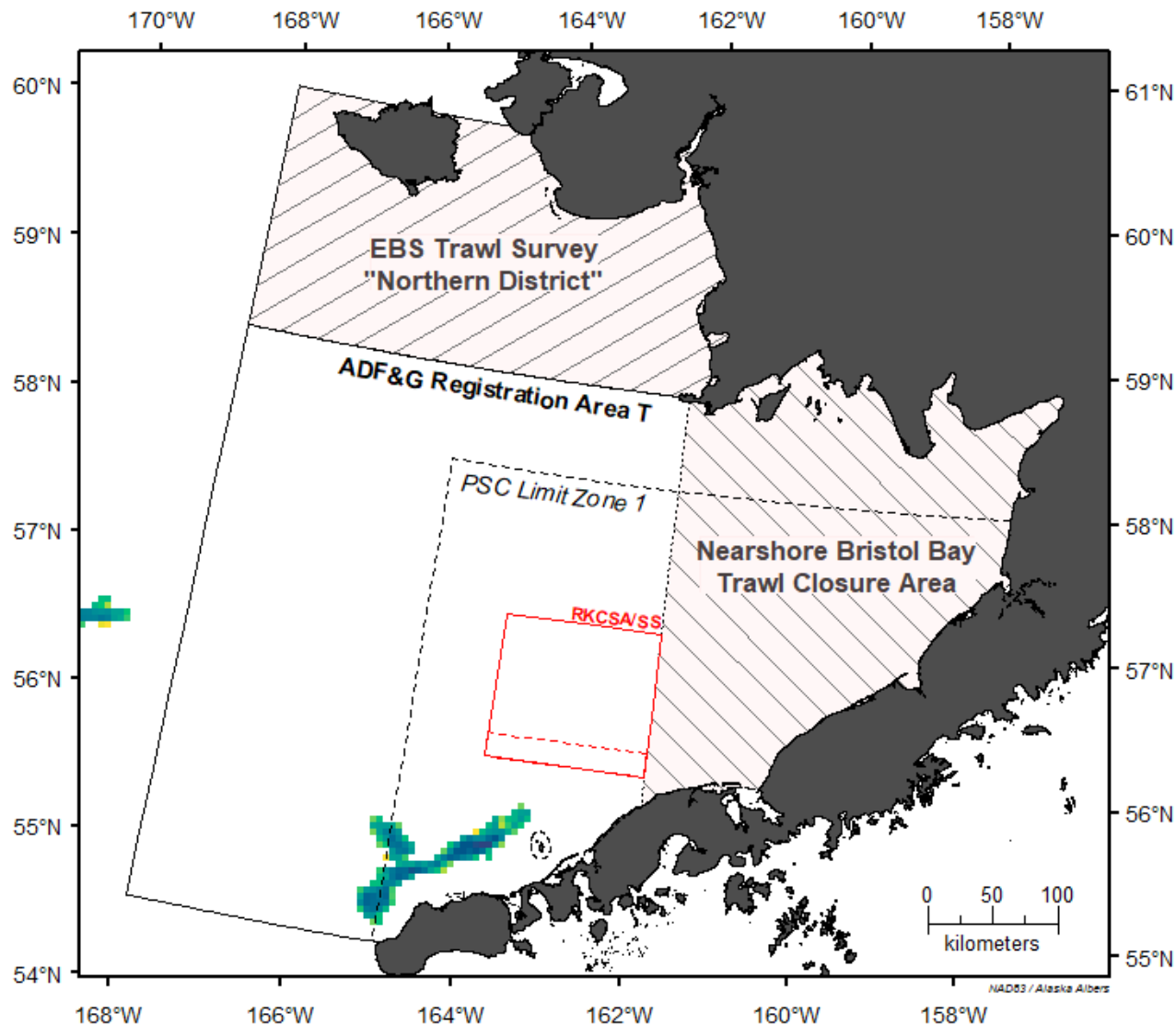
March 2018: Total Swept Area (SA), by PTR (8,078.4 km²)



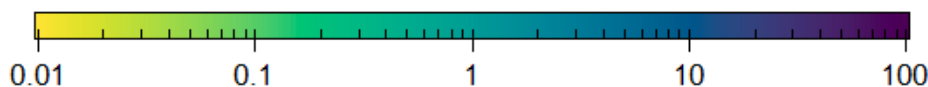
SA, km²



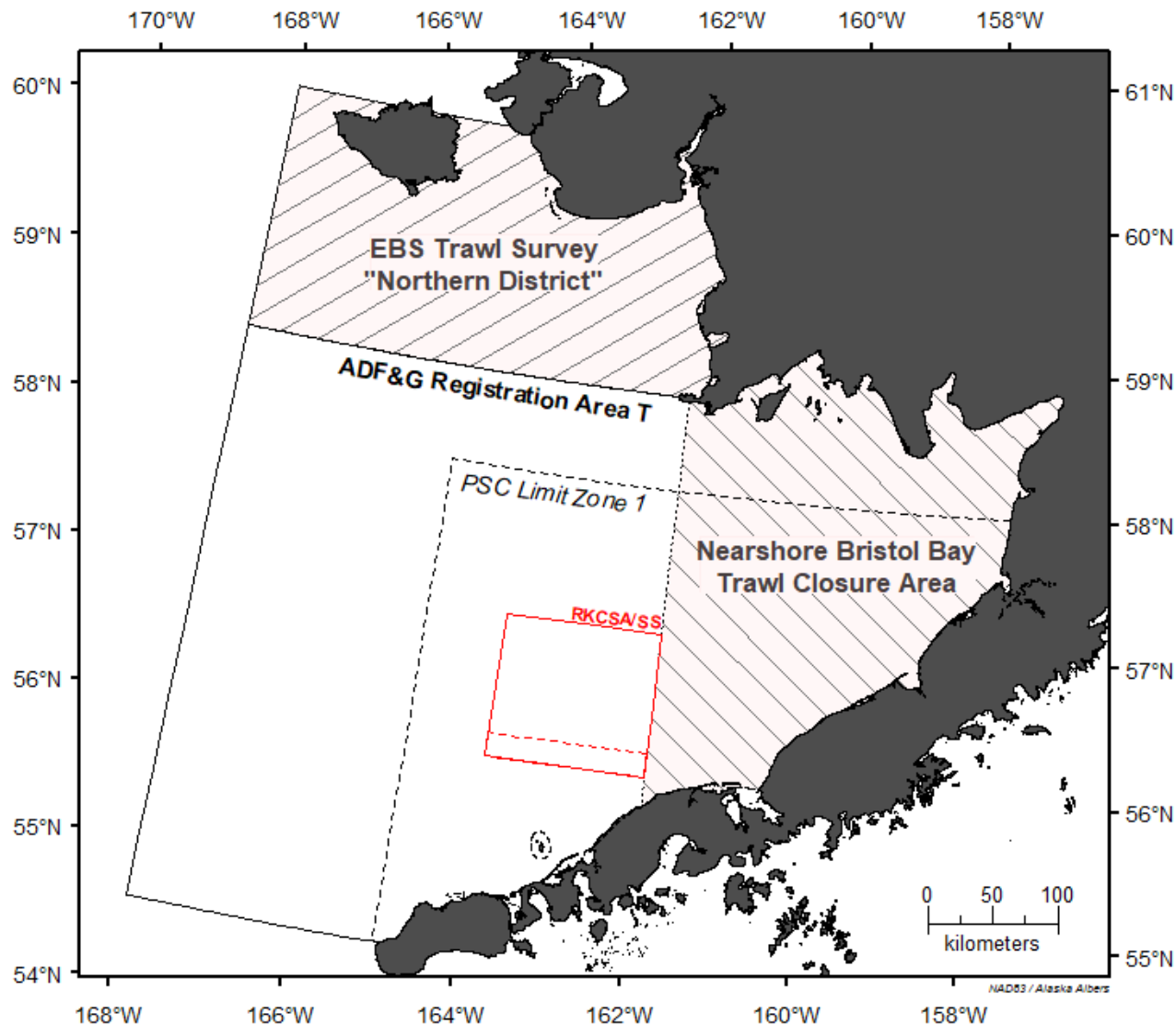
April 2018: Total Swept Area (SA), by PTR (717.5 km²)



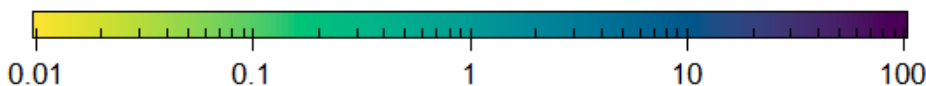
SA, km²



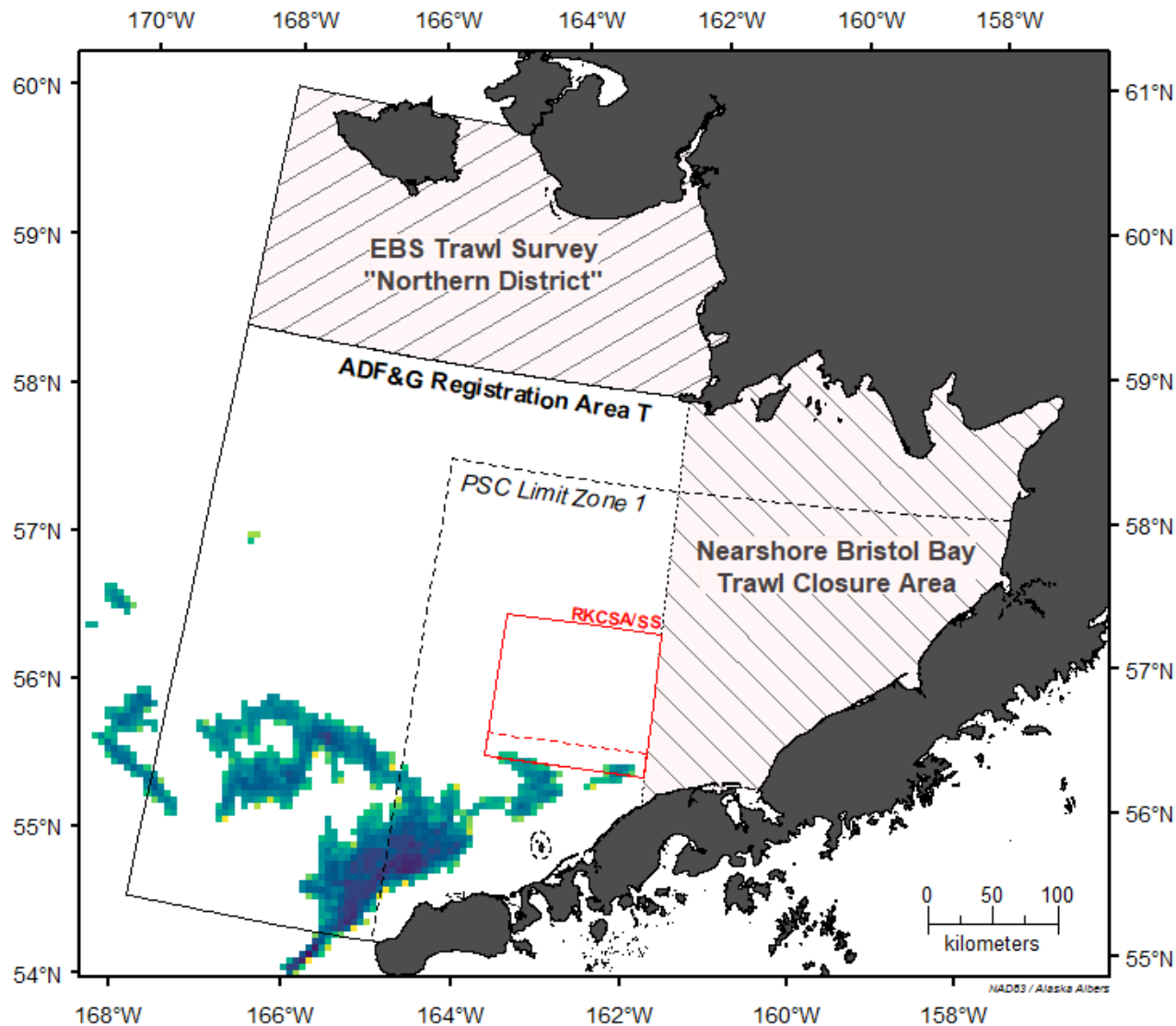
May 2018: Total Swept Area (SA), by PTR (0 km²)



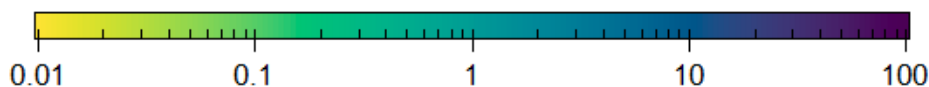
SA, km²



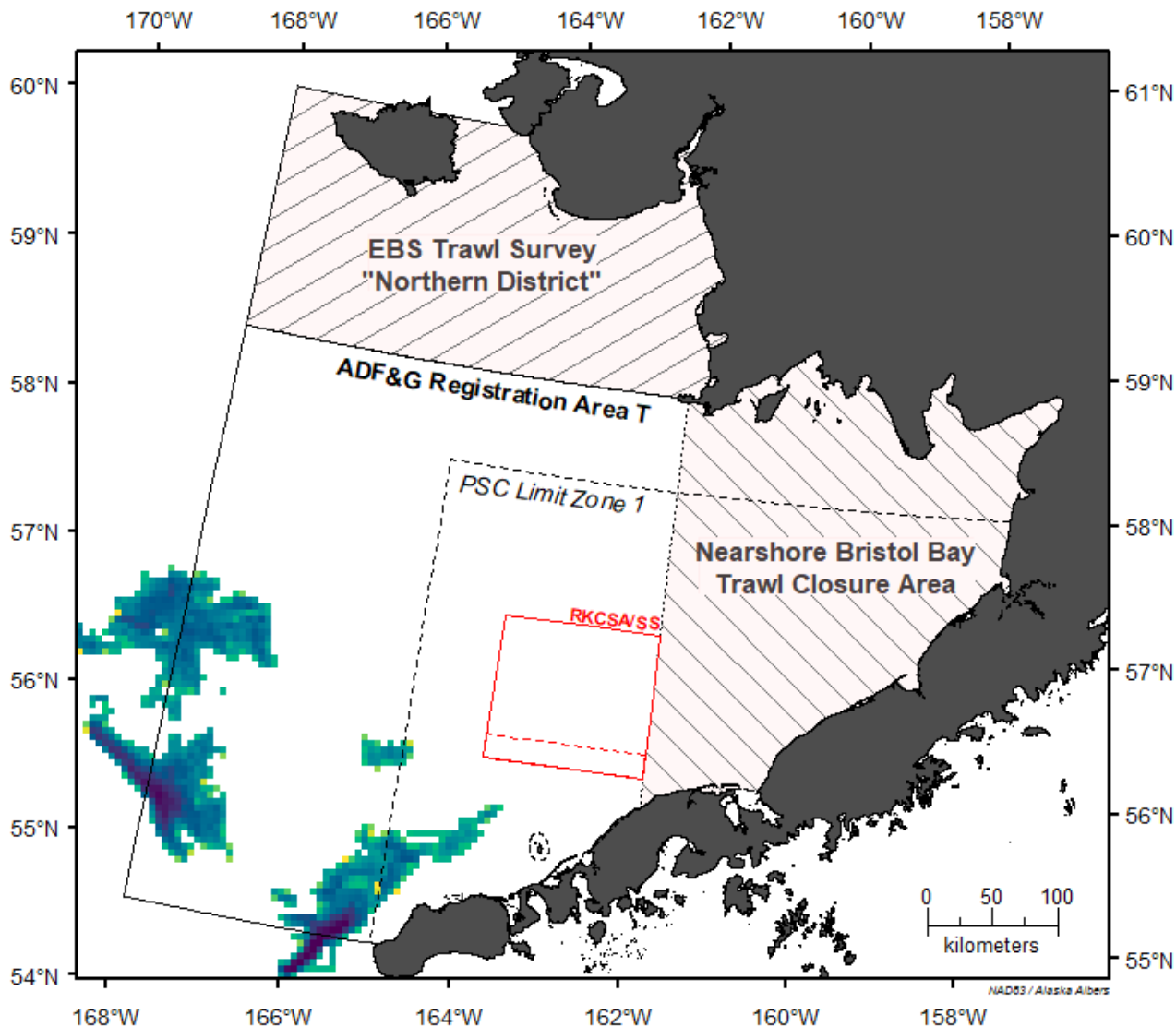
June 2018: Total Swept Area (SA), by PTR (5,775.6 km²)



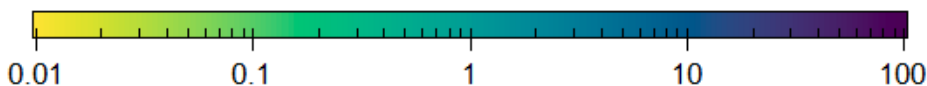
SA, km²



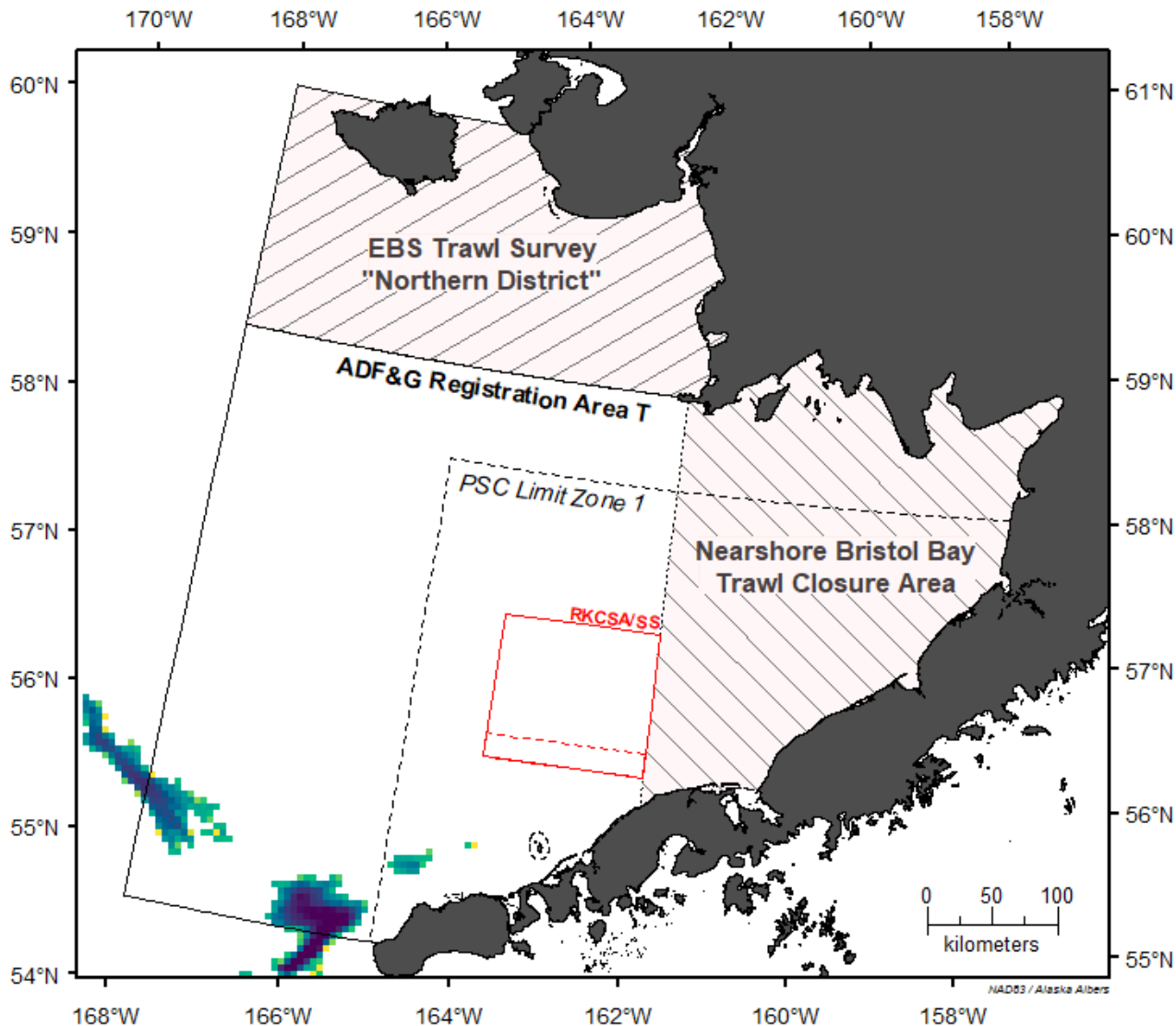
July 2018: Total Swept Area (SA), by PTR (4,630.9 km²)



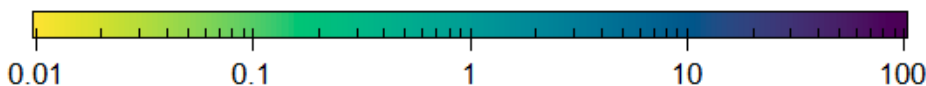
SA, km²



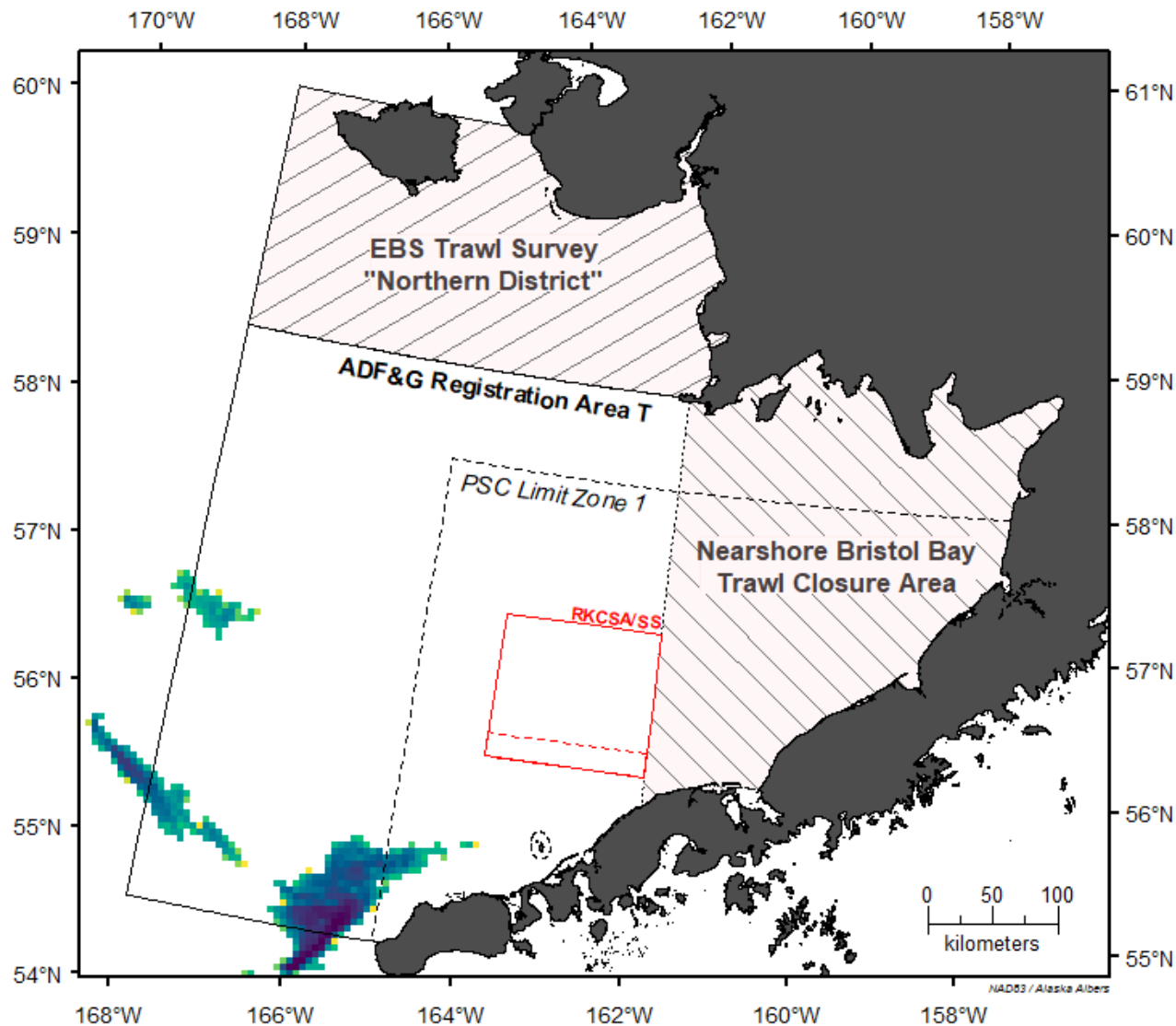
August 2018: Total Swept Area (SA), by PTR (4,041.6 km²)



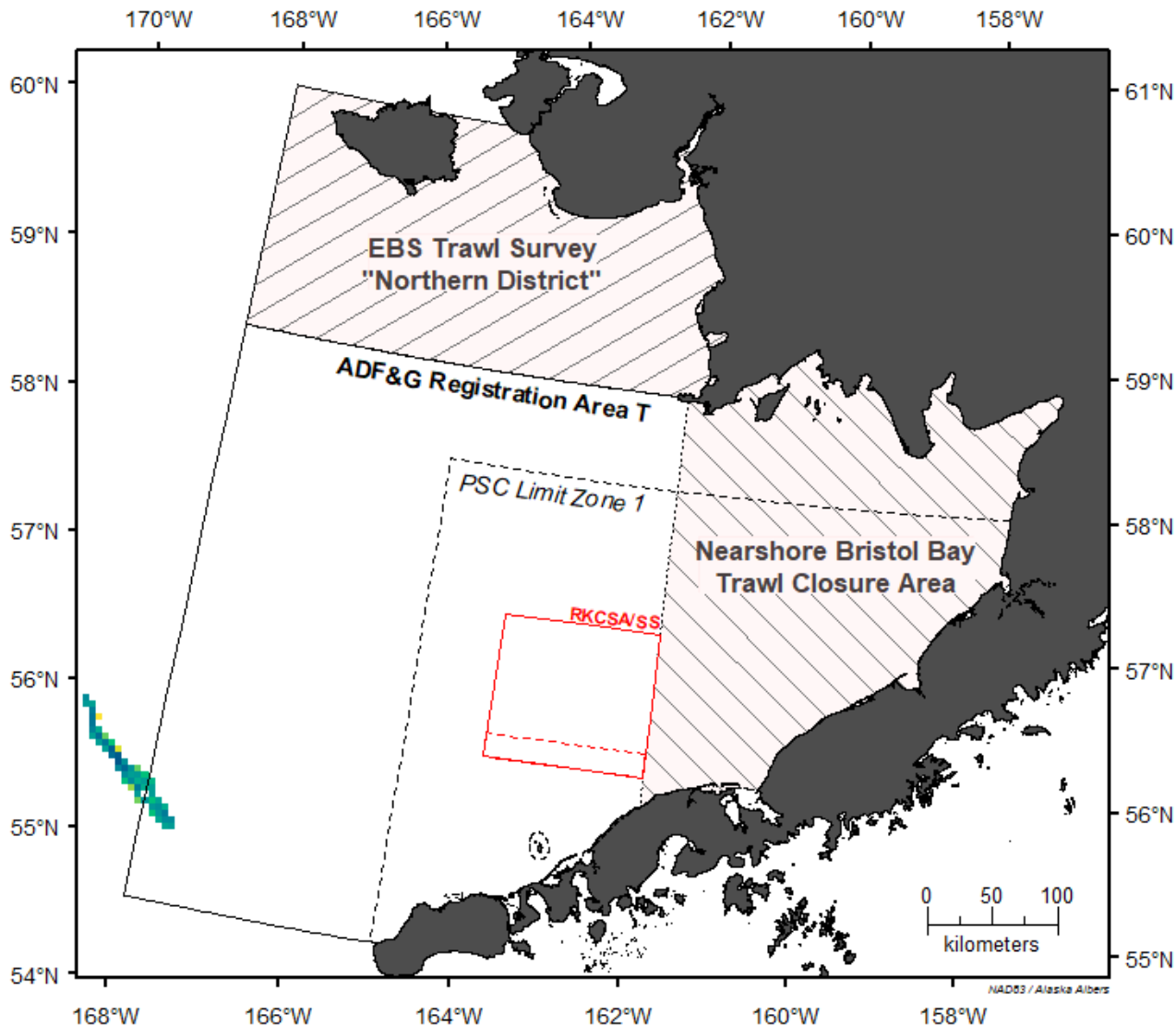
SA, km²



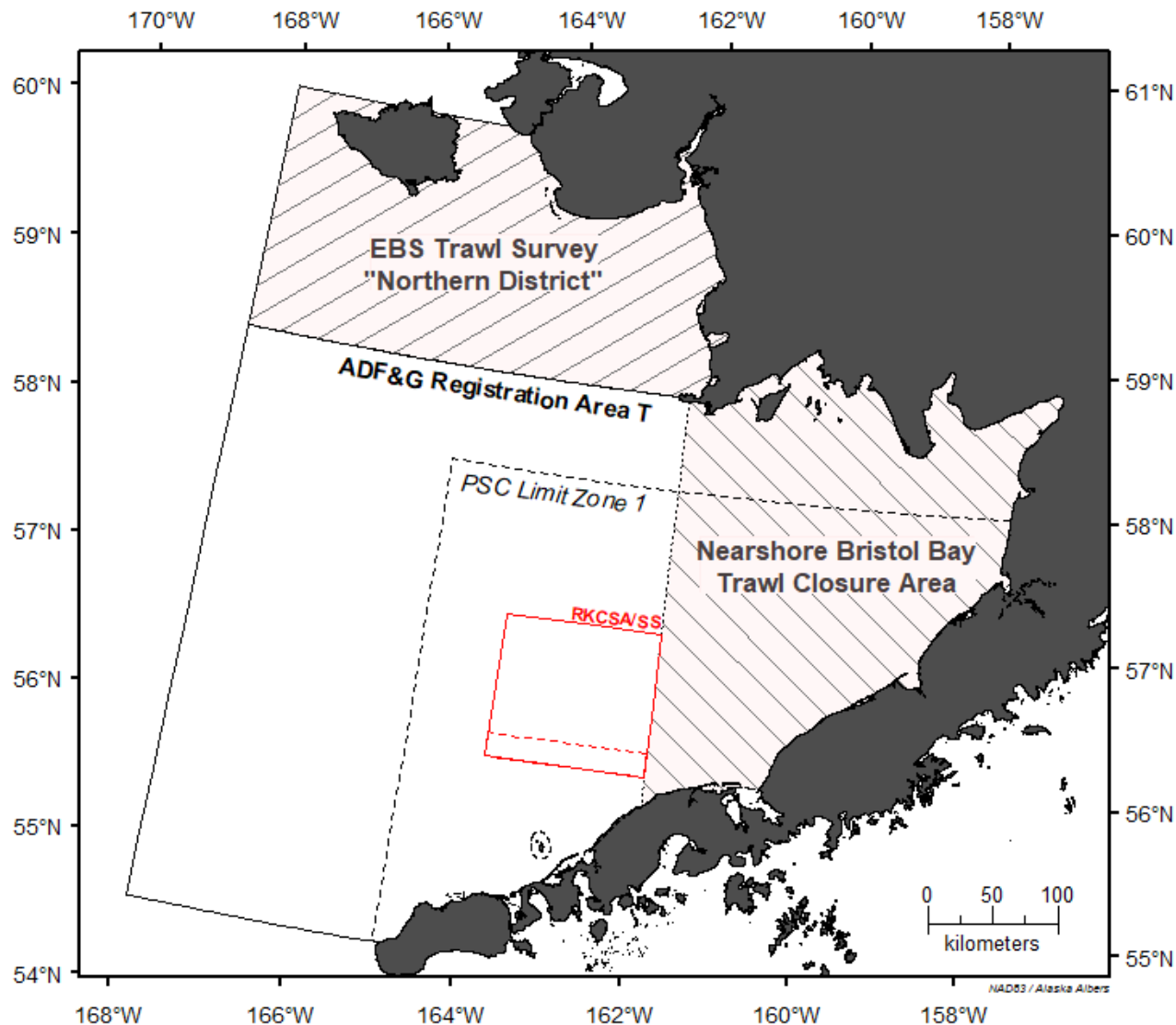
September 2018: Total Swept Area (SA), by PTR (3,361.2 km²)



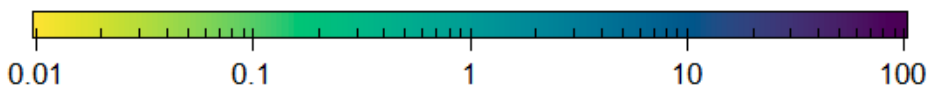
October 2018: Total Swept Area (SA), by PTR (19.9 km²)



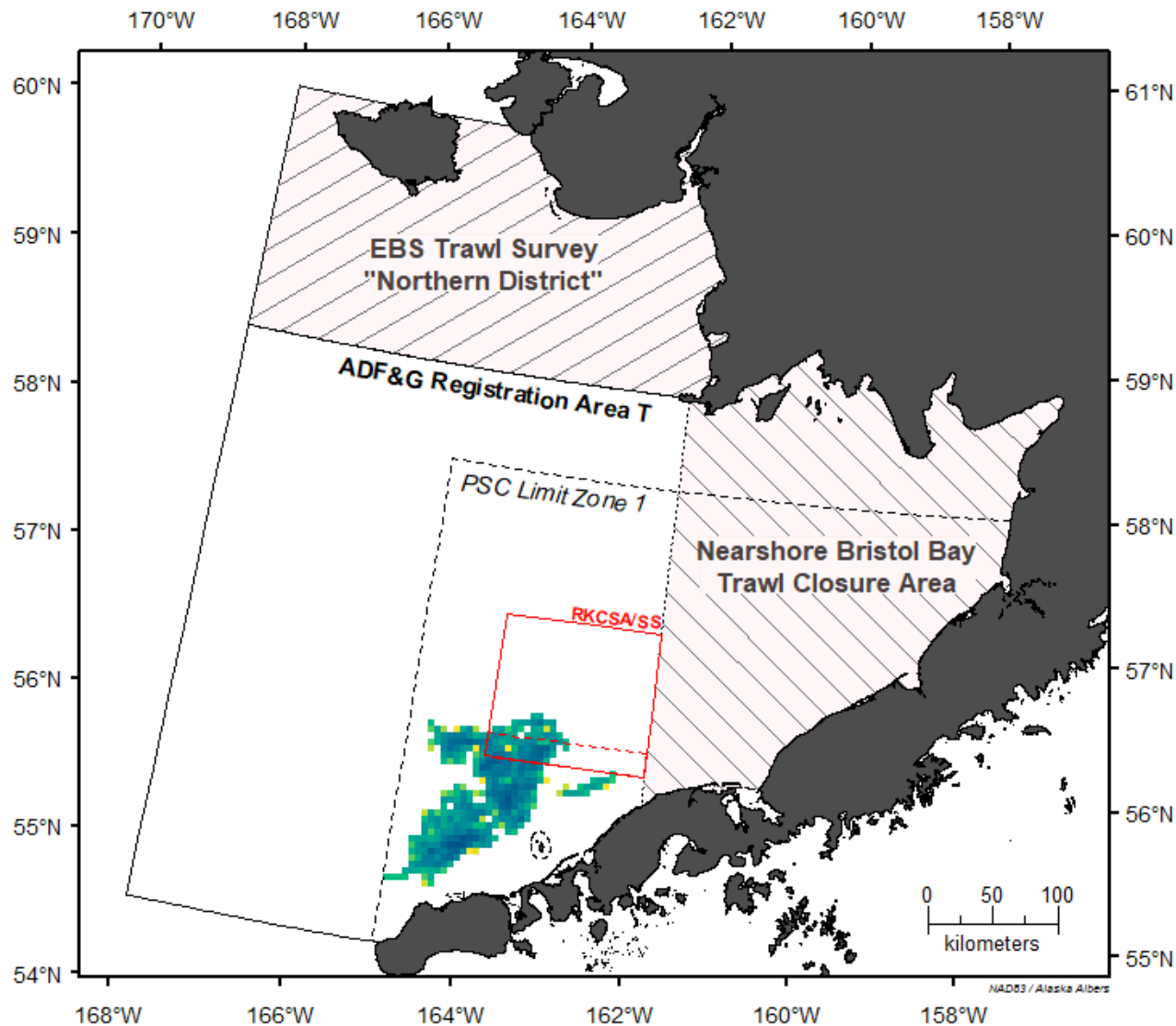
November 2018: Total Swept Area (SA), by PTR (0 km²)



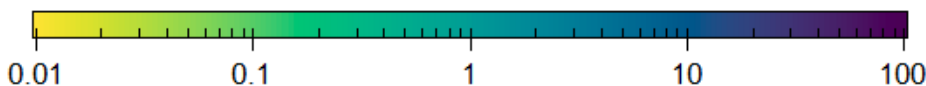
SA, km²



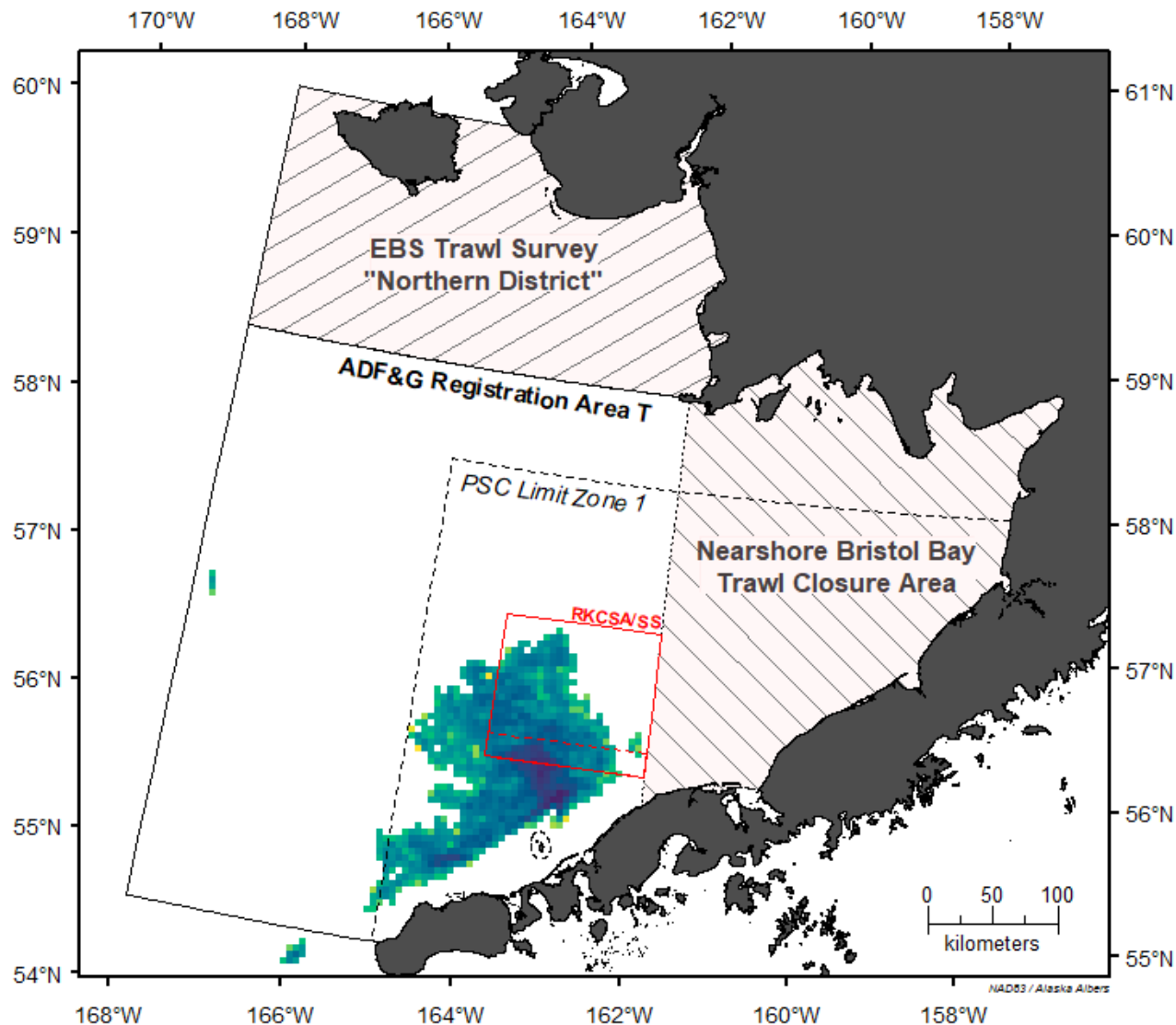
January 2019: Total Swept Area (SA), by PTR (1,782.4 km²)



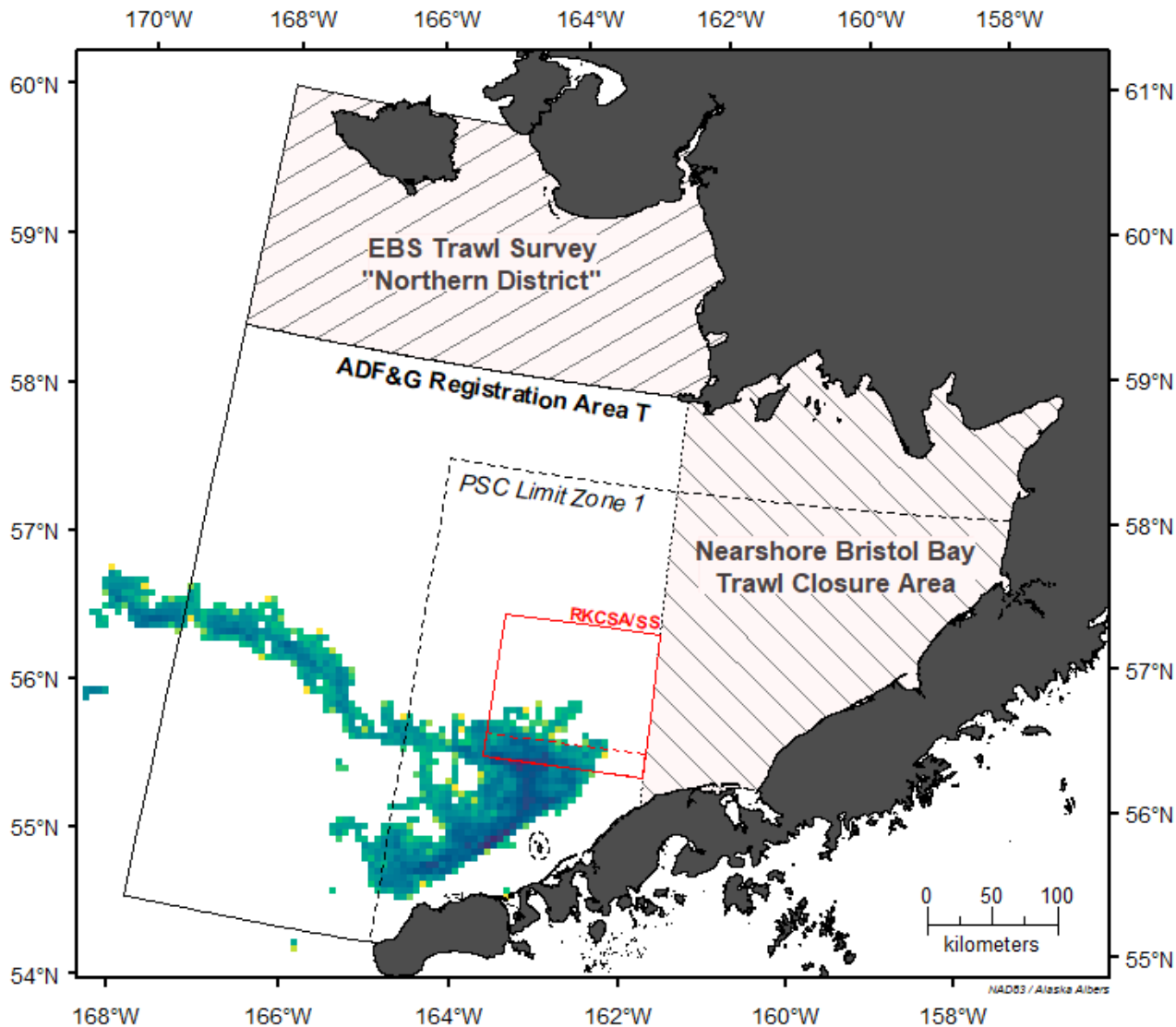
SA, km²



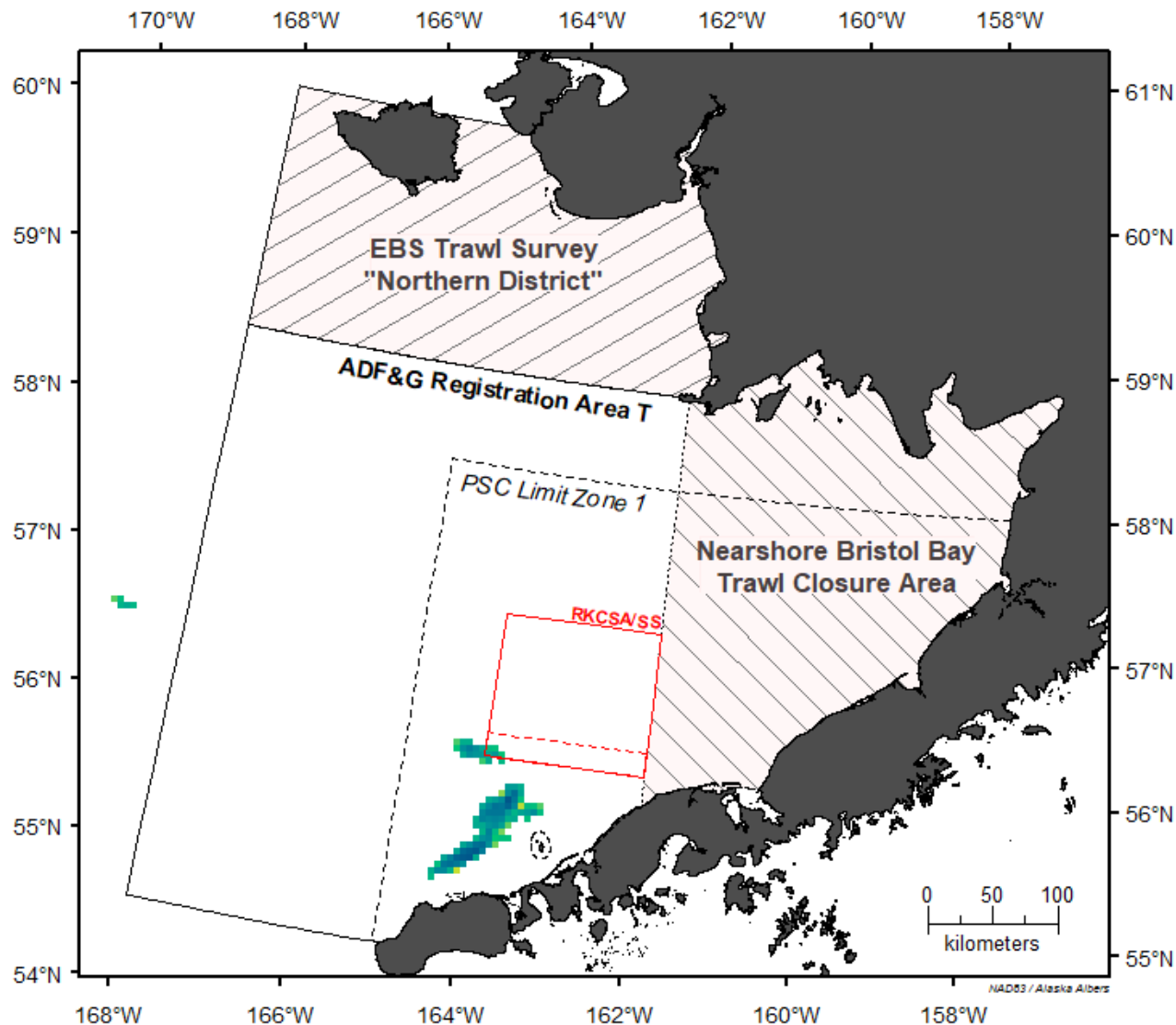
February 2019: Total Swept Area (SA), by PTR (9,447.4 km²)



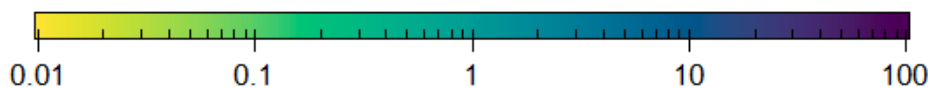
March 2019: Total Swept Area (SA), by PTR (5,237.2 km²)



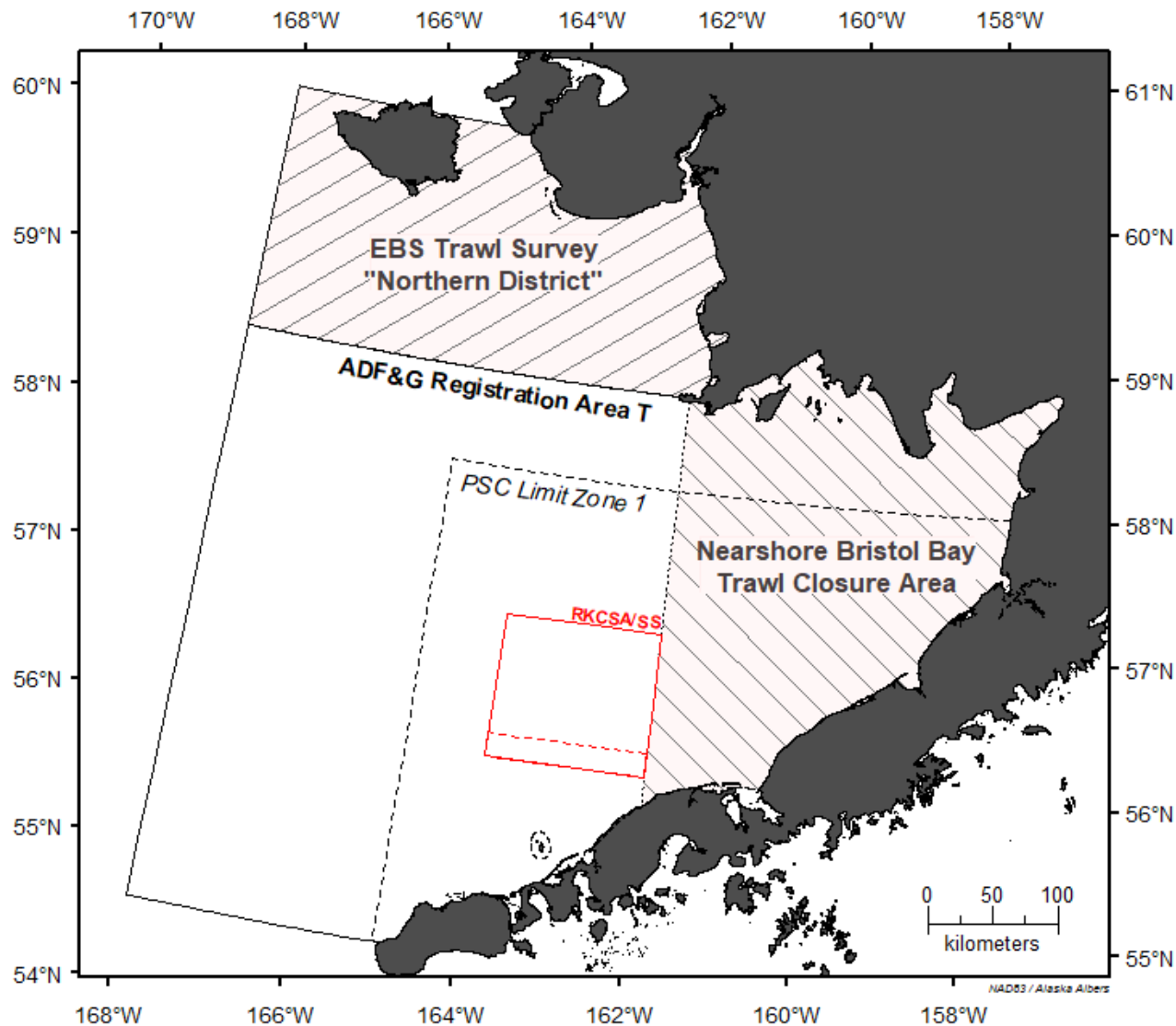
April 2019: Total Swept Area (SA), by PTR (413.1 km²)



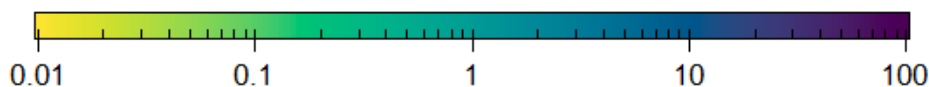
SA, km²



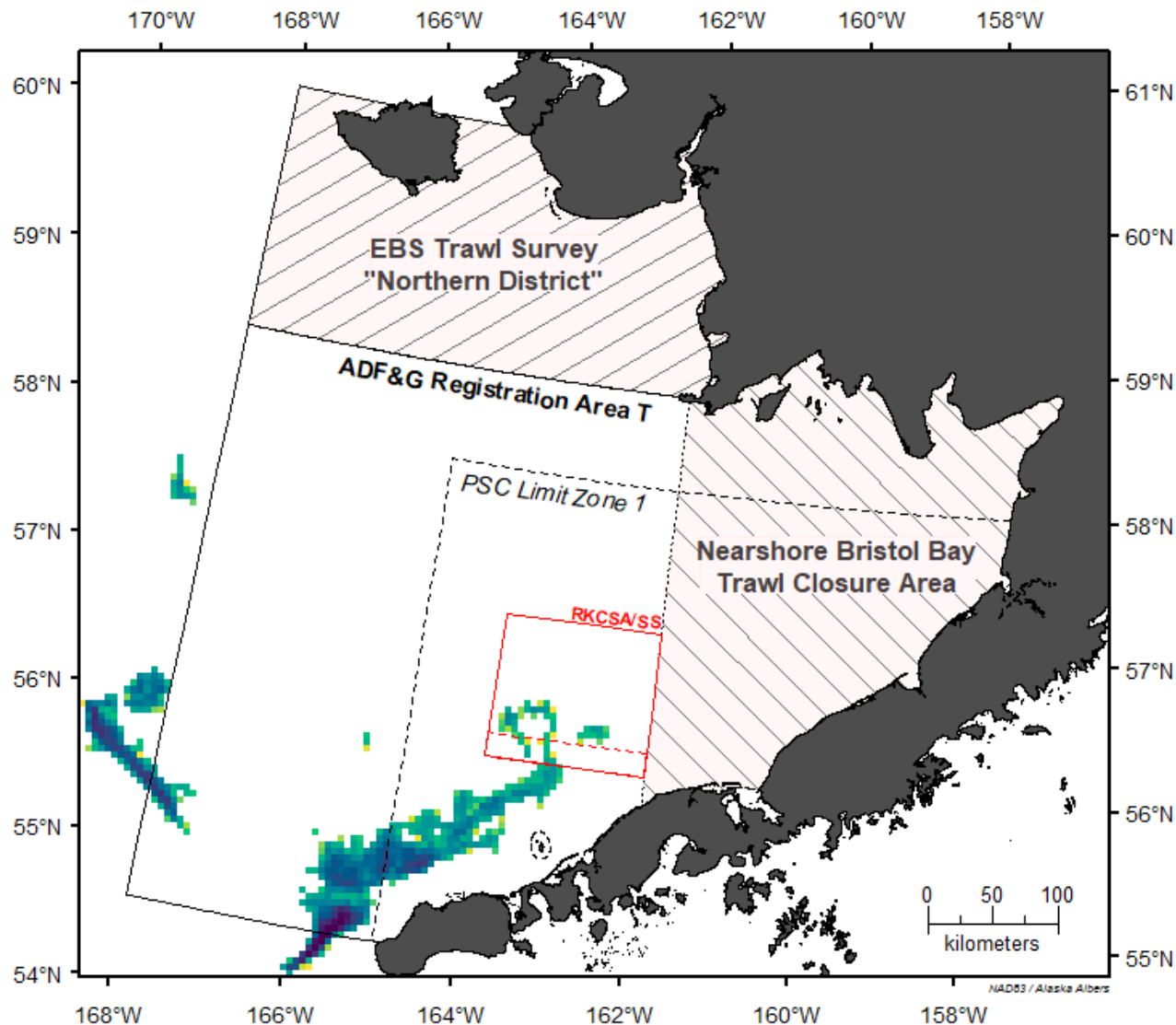
May 2019: Total Swept Area (SA), by PTR (0 km²)



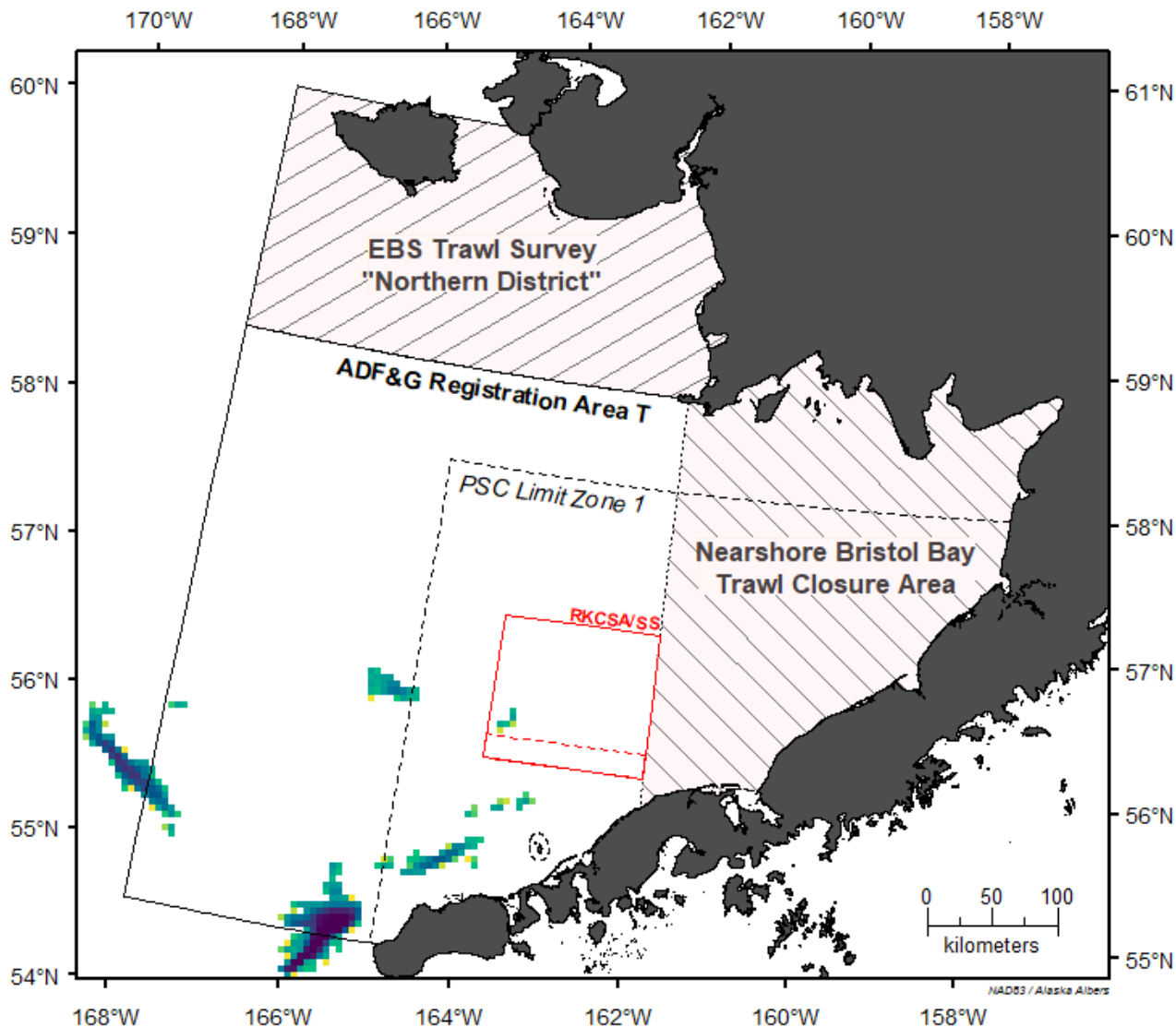
SA, km²



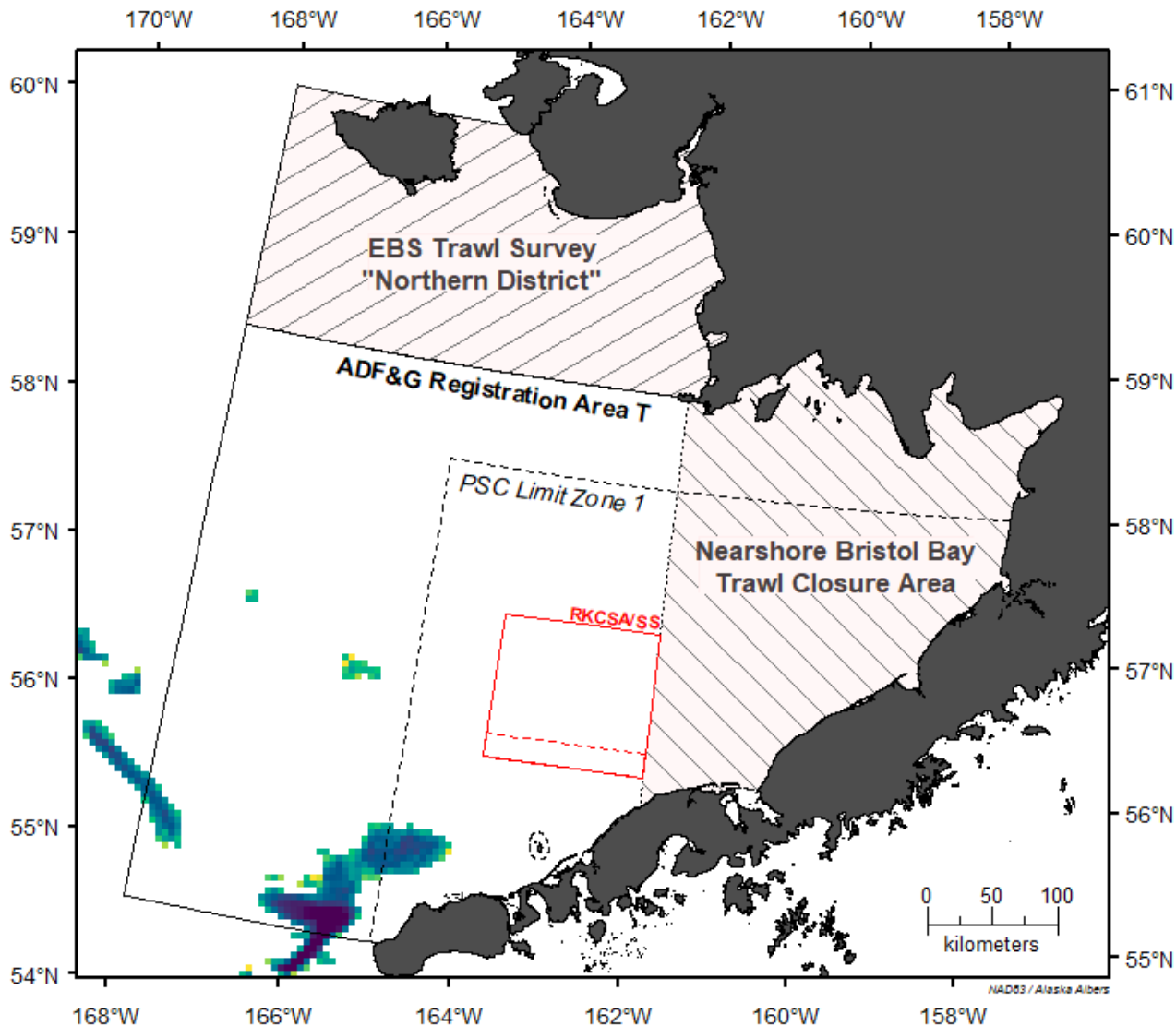
June 2019: Total Swept Area (SA), by PTR (3,159.1 km²)



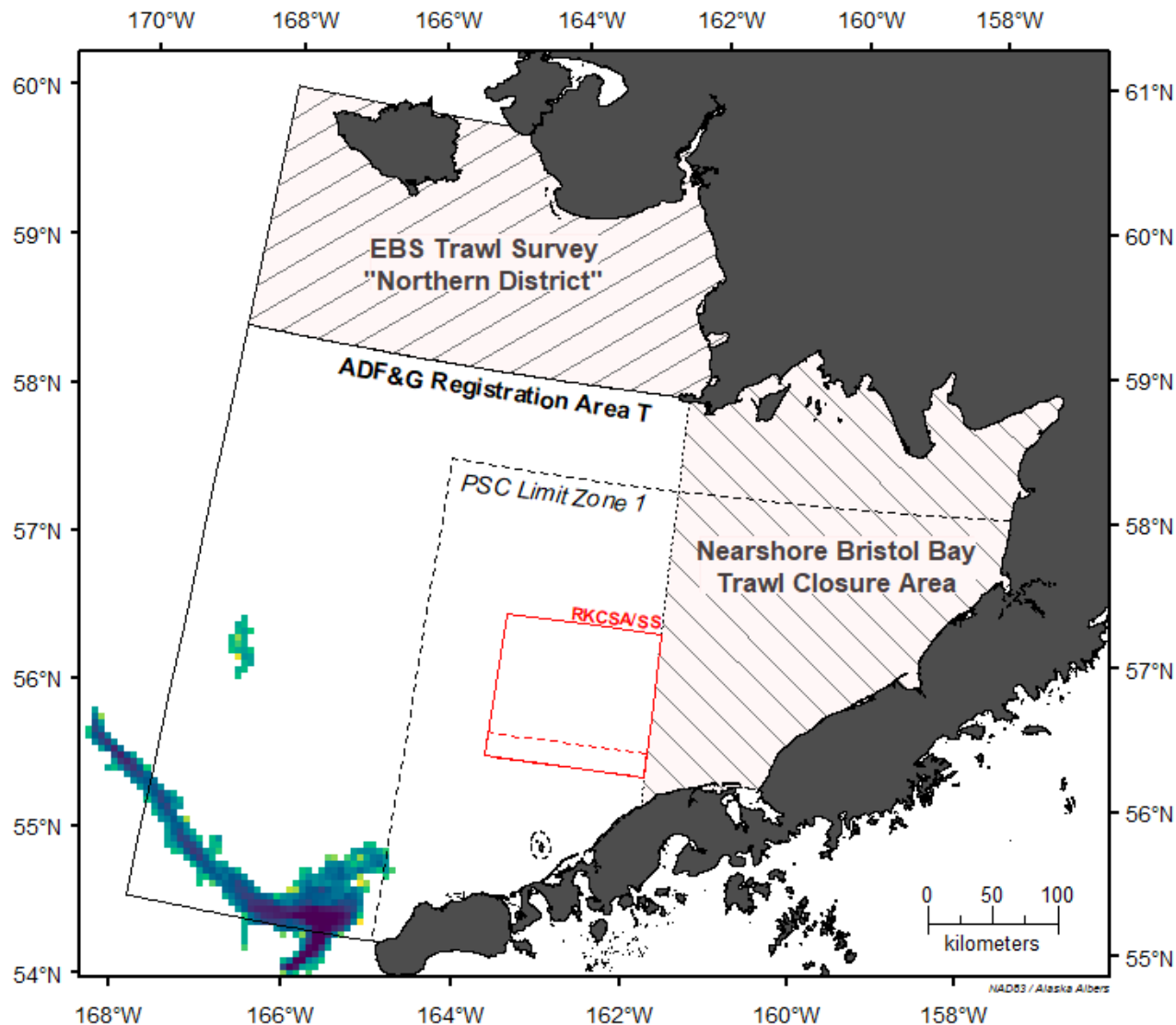
July 2019: Total Swept Area (SA), by PTR (3,285.6 km²)



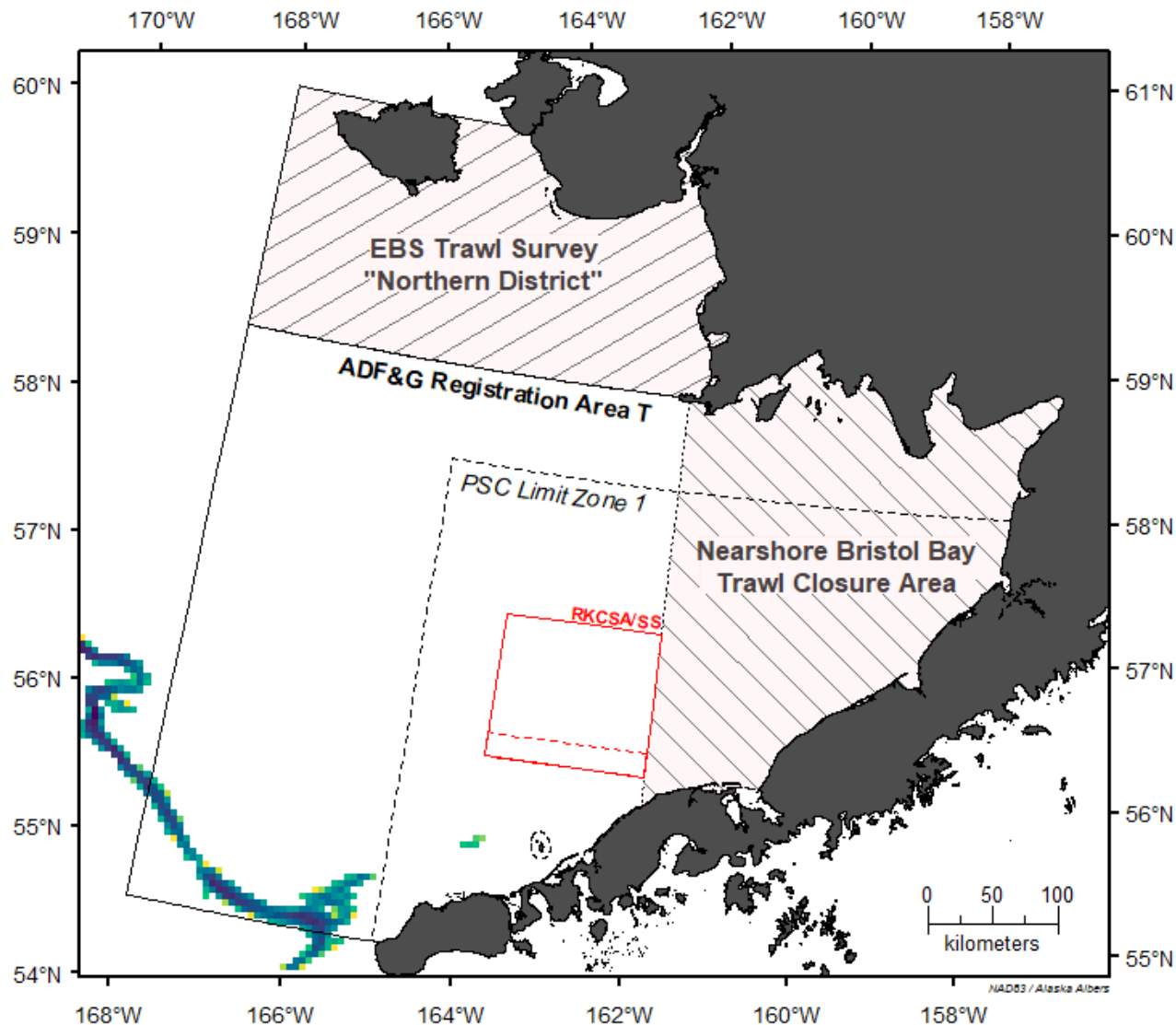
August 2019: Total Swept Area (SA), by PTR (6,766.7 km²)



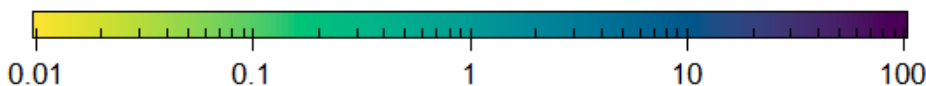
September 2019: Total Swept Area (SA), by PTR (4,905.6 km²)



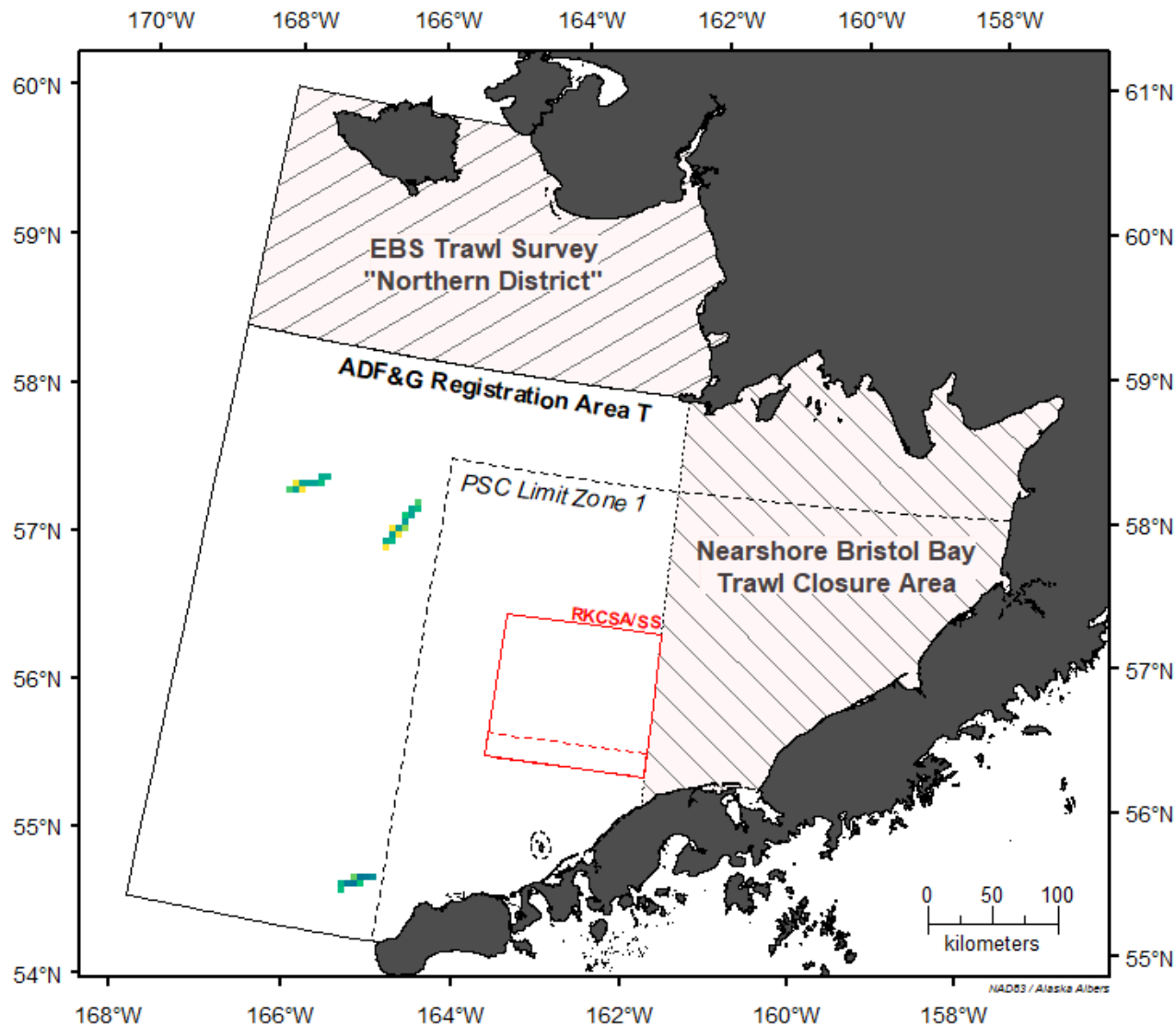
October 2019: Total Swept Area (SA), by PTR (1,161.1 km²)



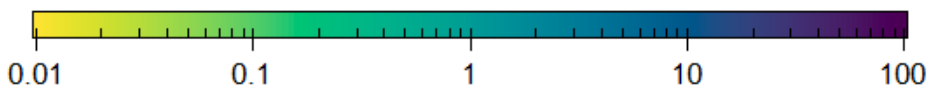
SA, km²



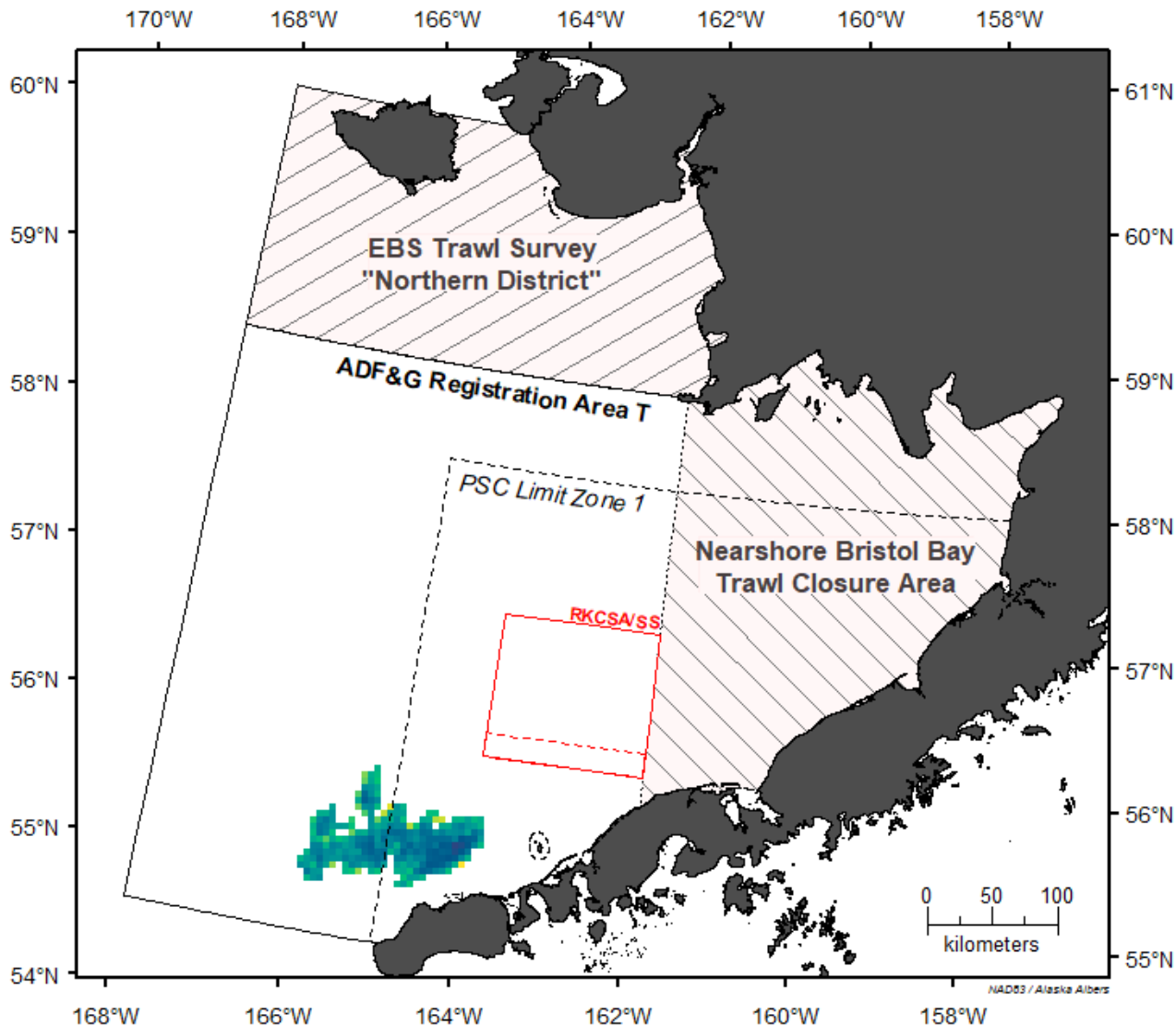
November 2019: Total Swept Area (SA), by PTR (26.7 km²)



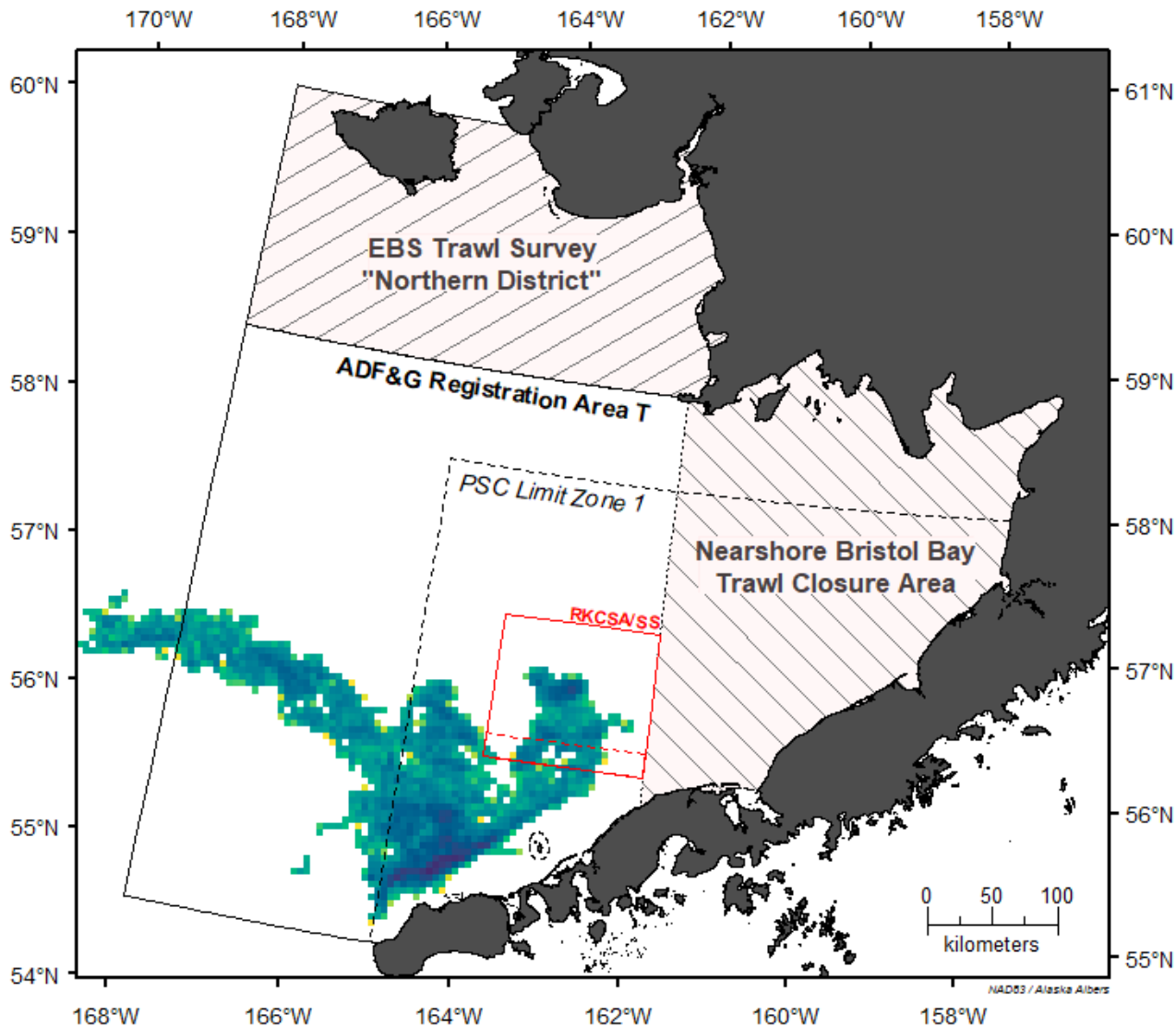
SA, km²



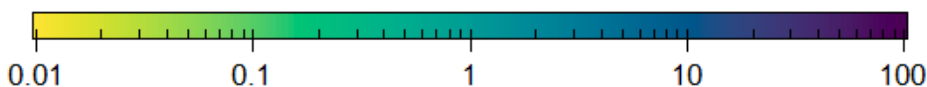
January 2020: Total Swept Area (SA), by PTR (1,153.4 km²)



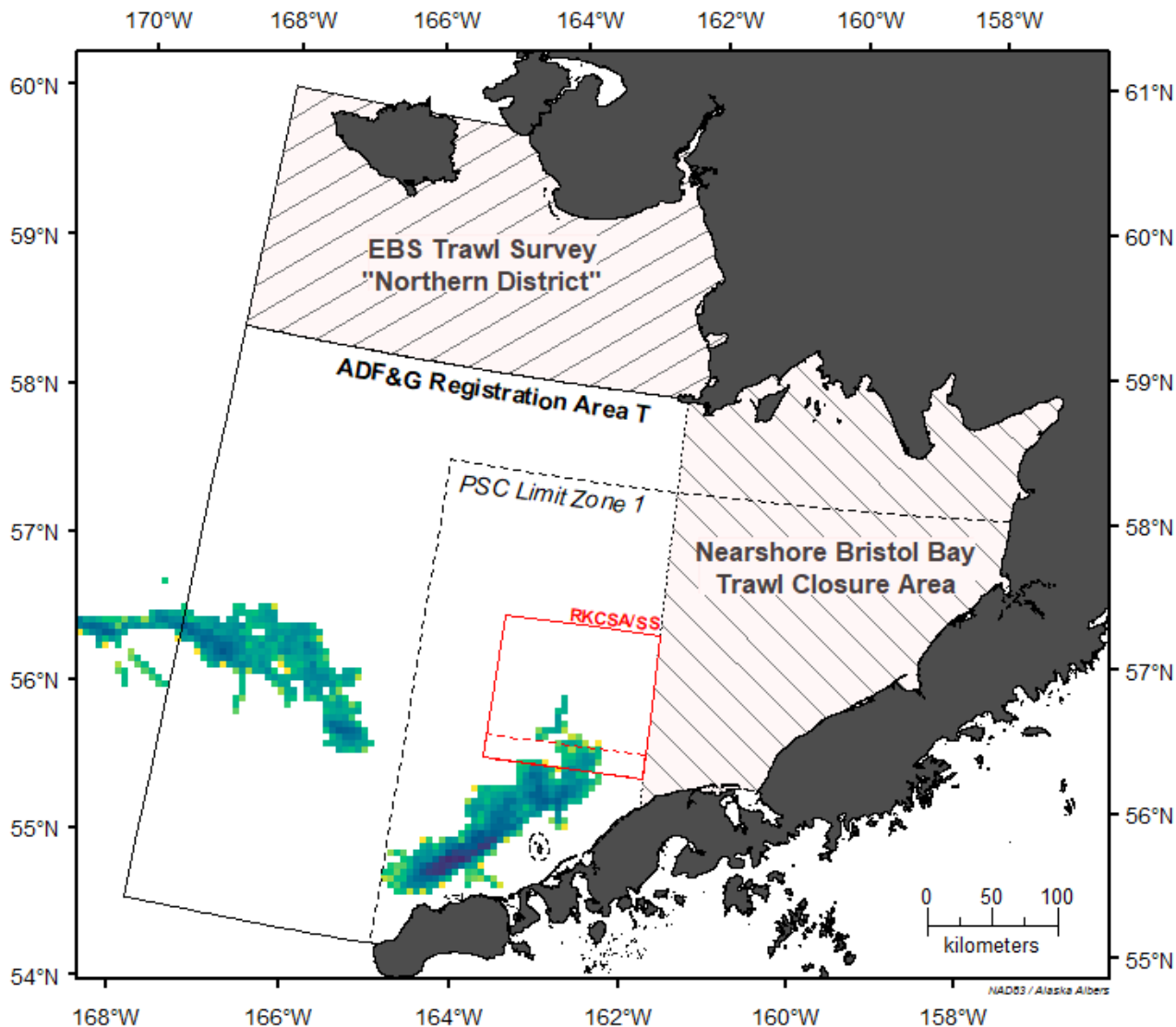
February 2020: Total Swept Area (SA), by PTR (6,668.5 km²)



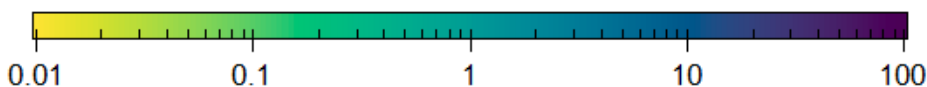
SA, km²



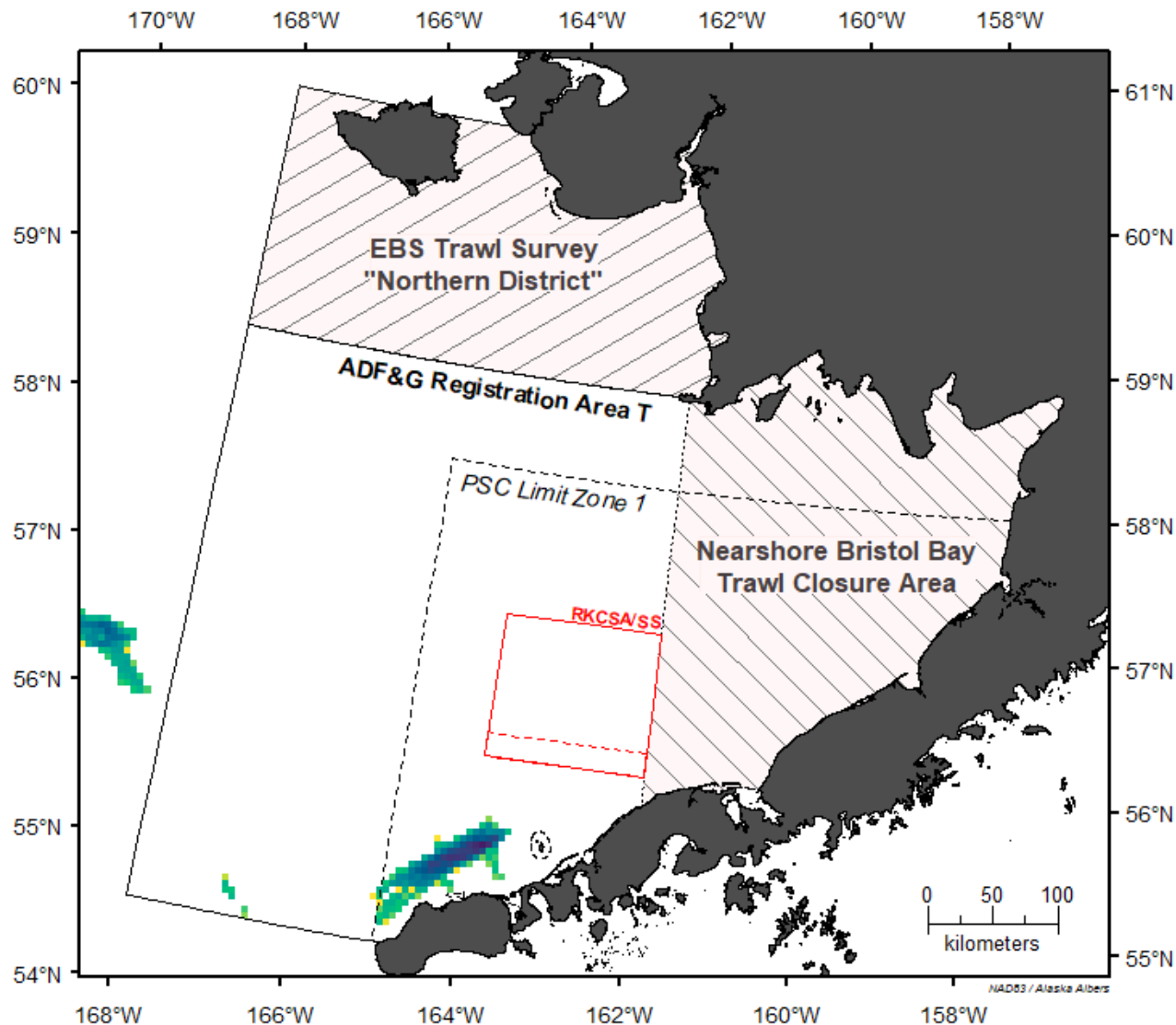
March 2020: Total Swept Area (SA), by PTR (2,527.7 km²)



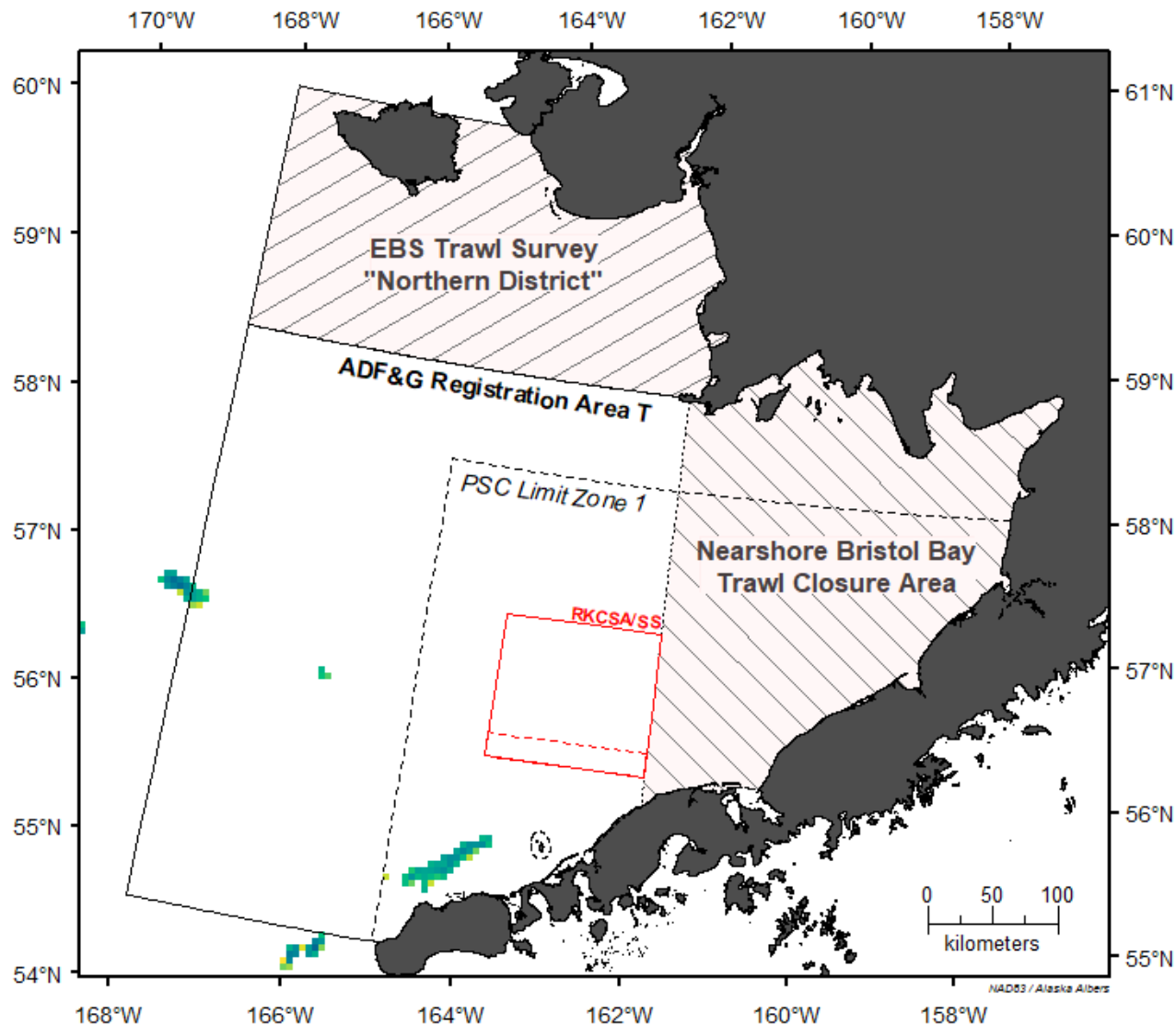
SA, km²



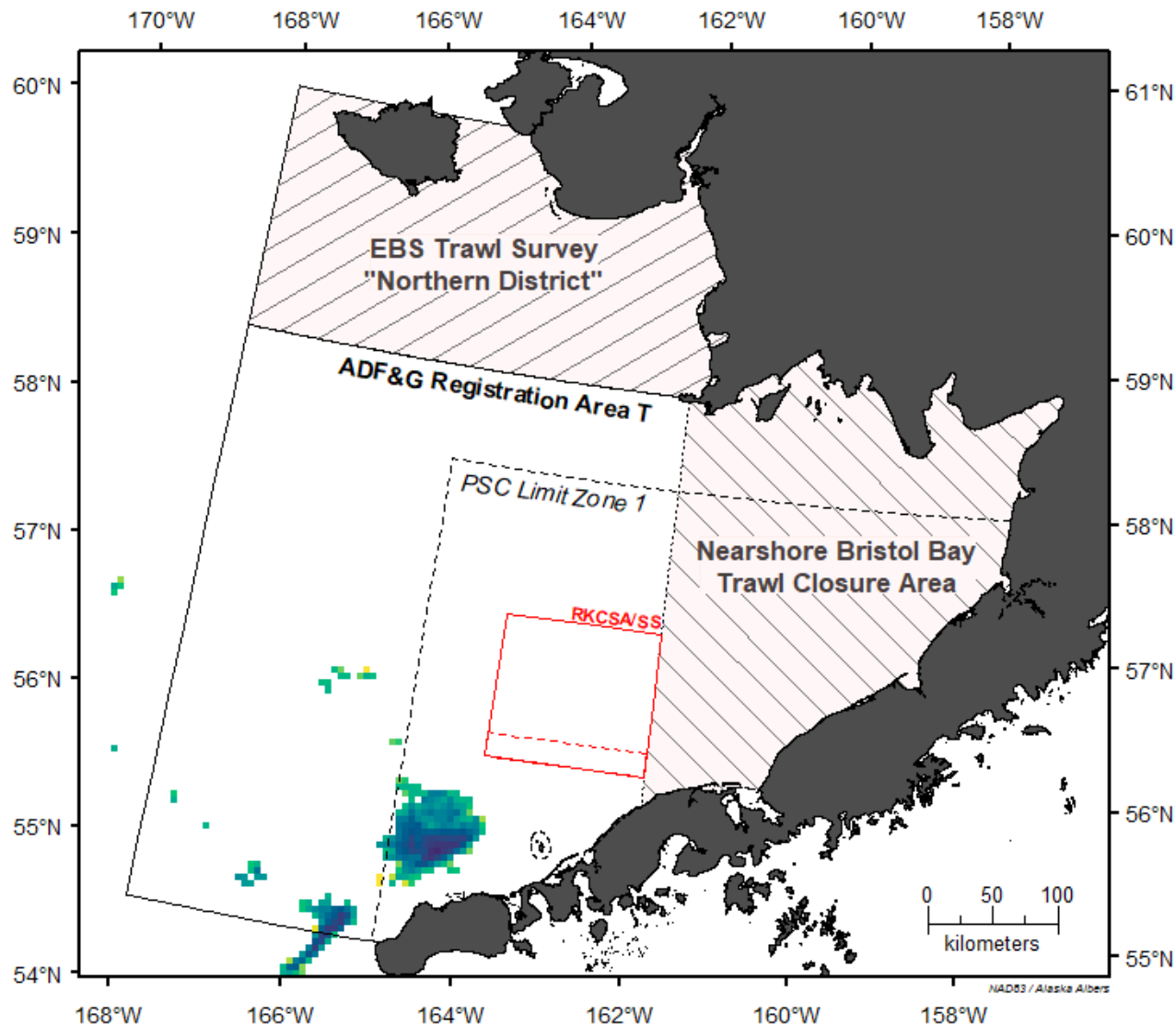
April 2020: Total Swept Area (SA), by PTR (1,389.1 km²)



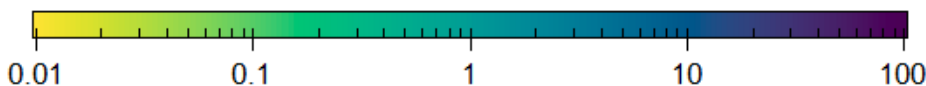
May 2020: Total Swept Area (SA), by PTR (61.8 km²)



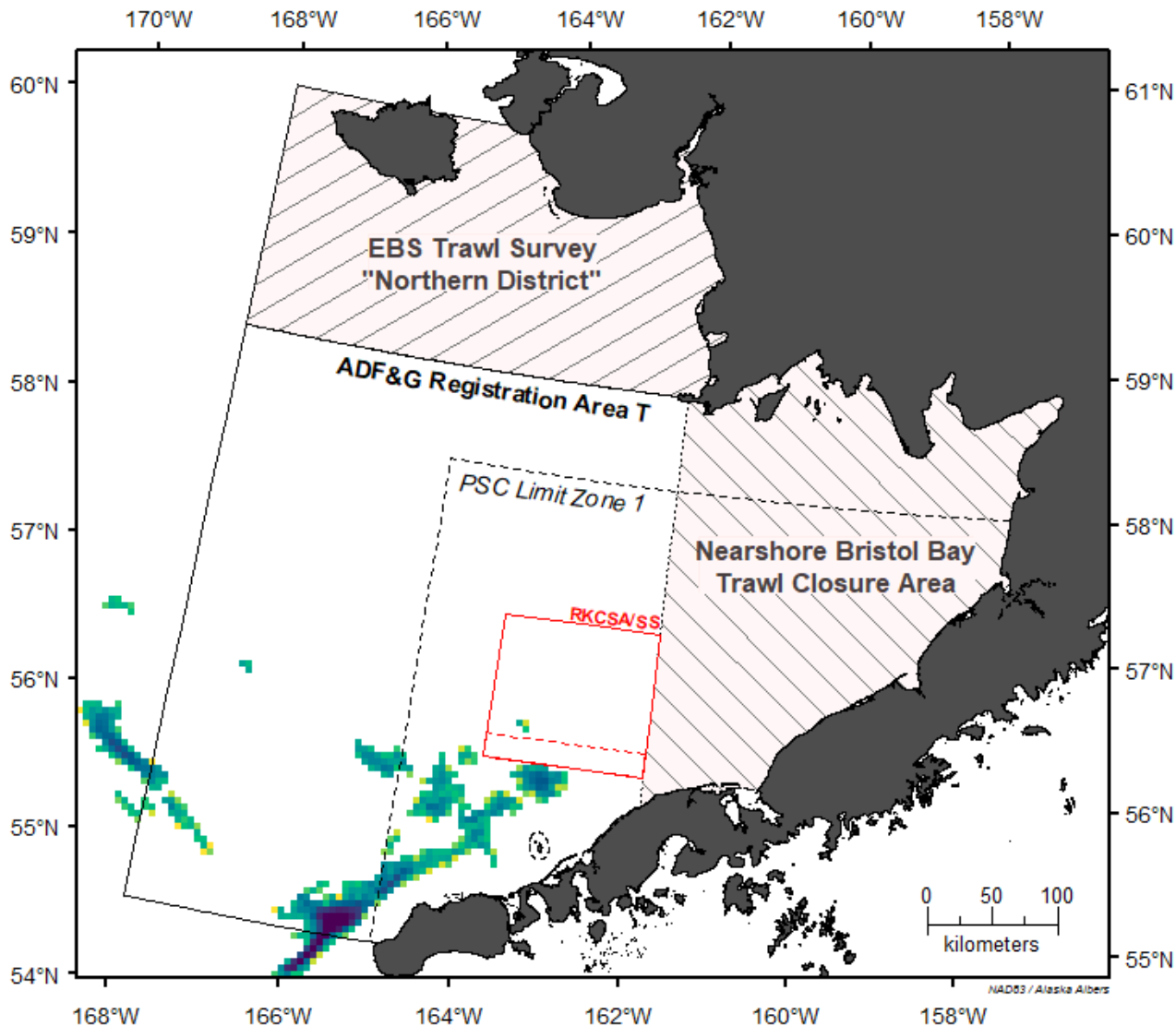
June 2020: Total Swept Area (SA), by PTR (2,172.5 km²)



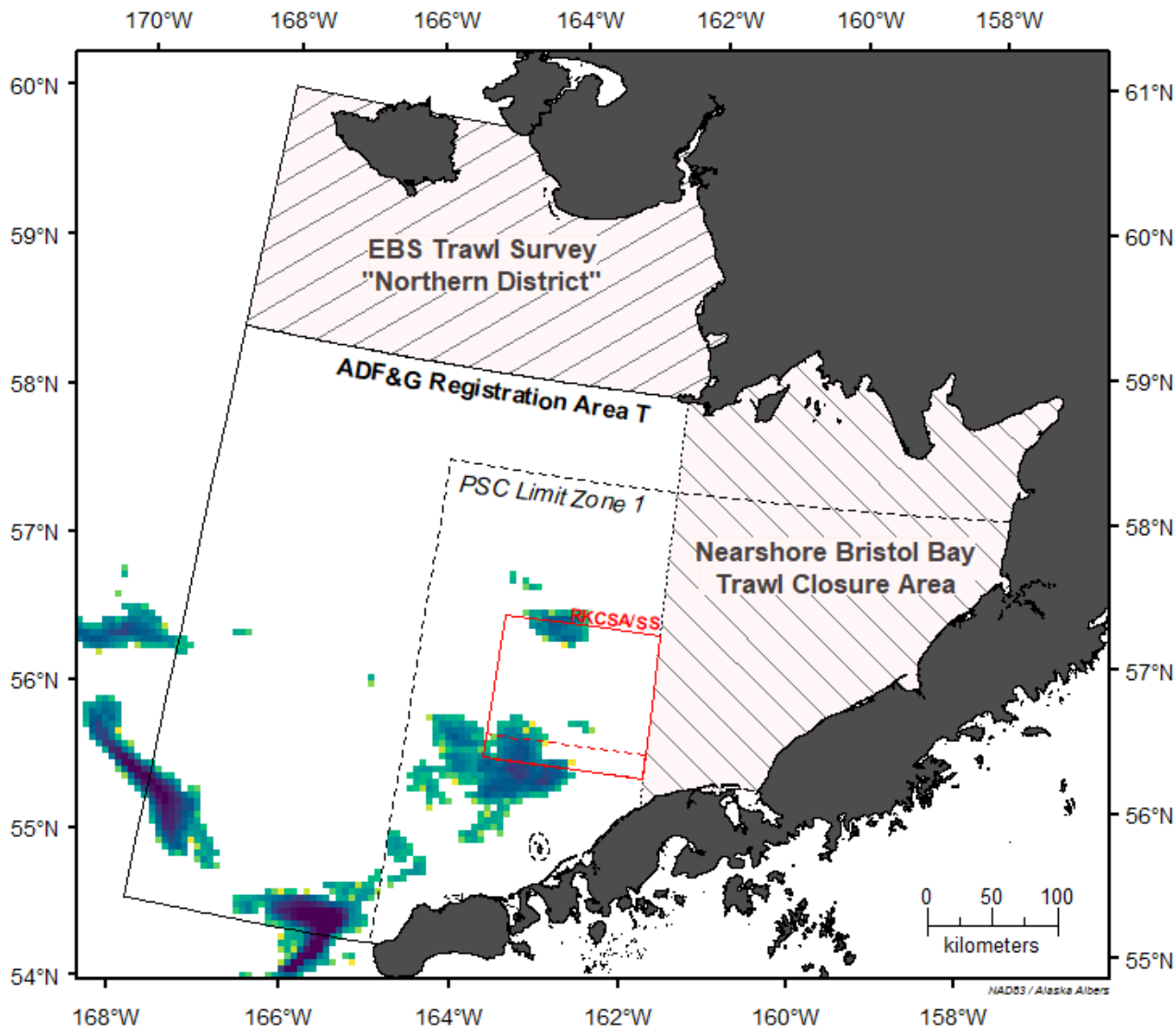
SA, km²



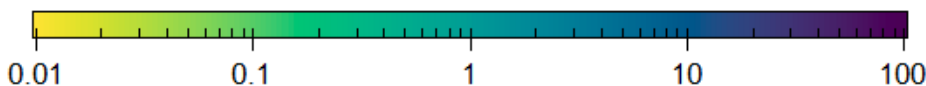
July 2020: Total Swept Area (SA), by PTR (2,555.8 km²)



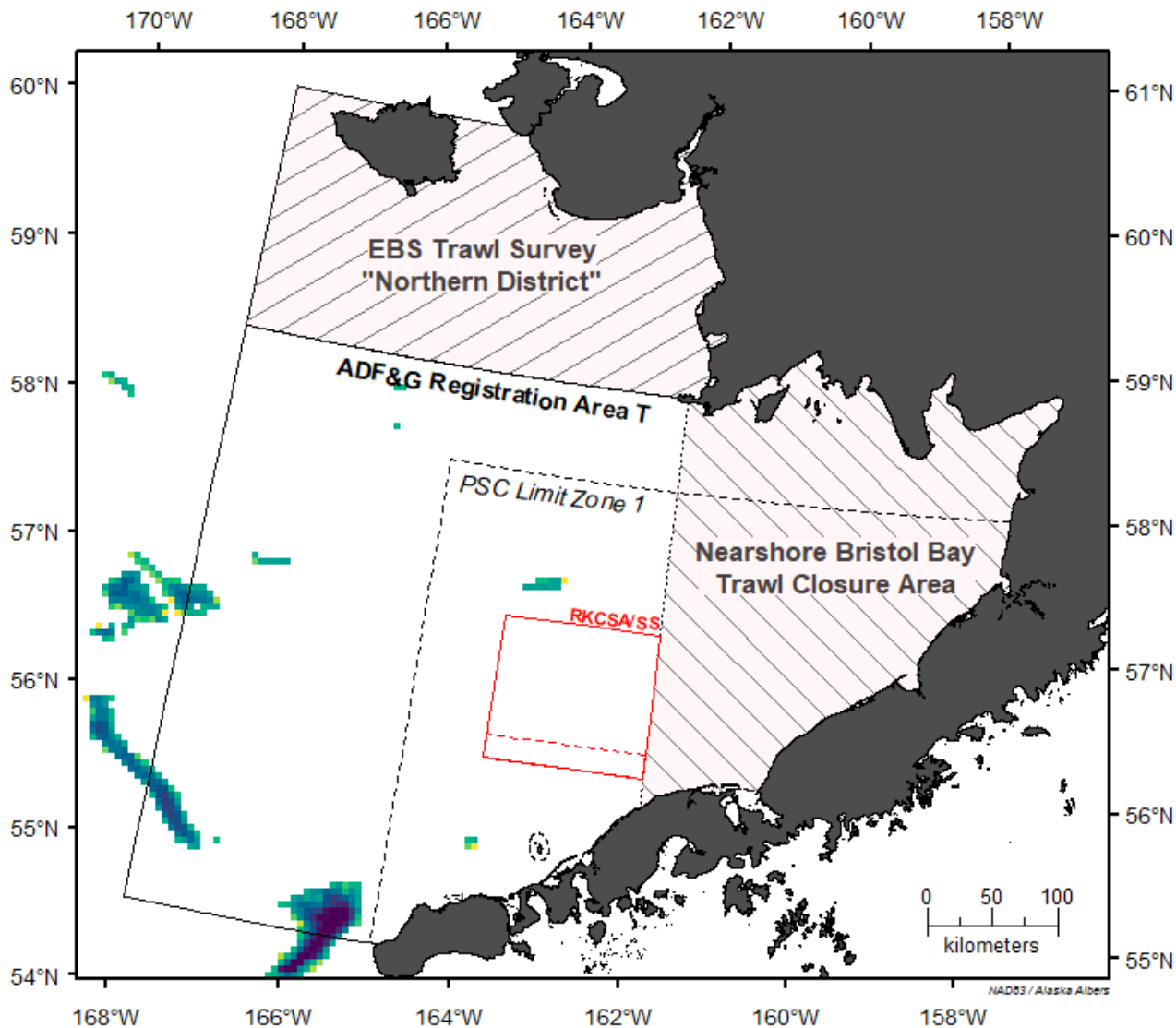
August 2020: Total Swept Area (SA), by PTR (9,168.2 km²)



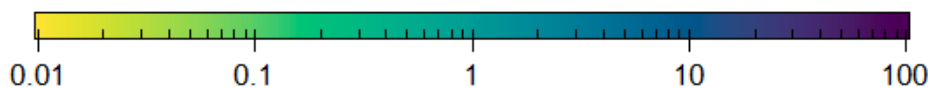
SA, km²



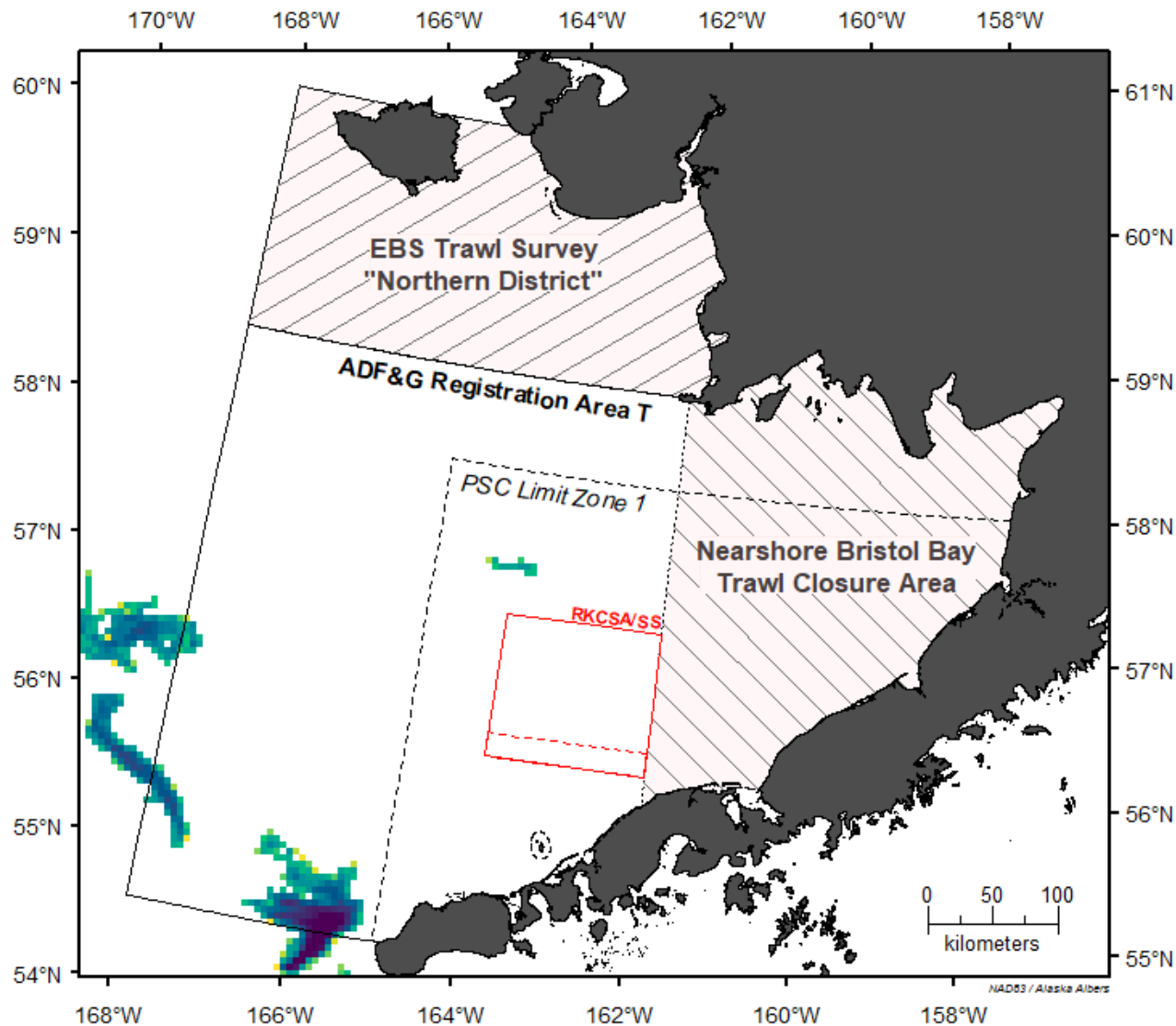
September 2020: Total Swept Area (SA), by PTR (2,668.8 km²)



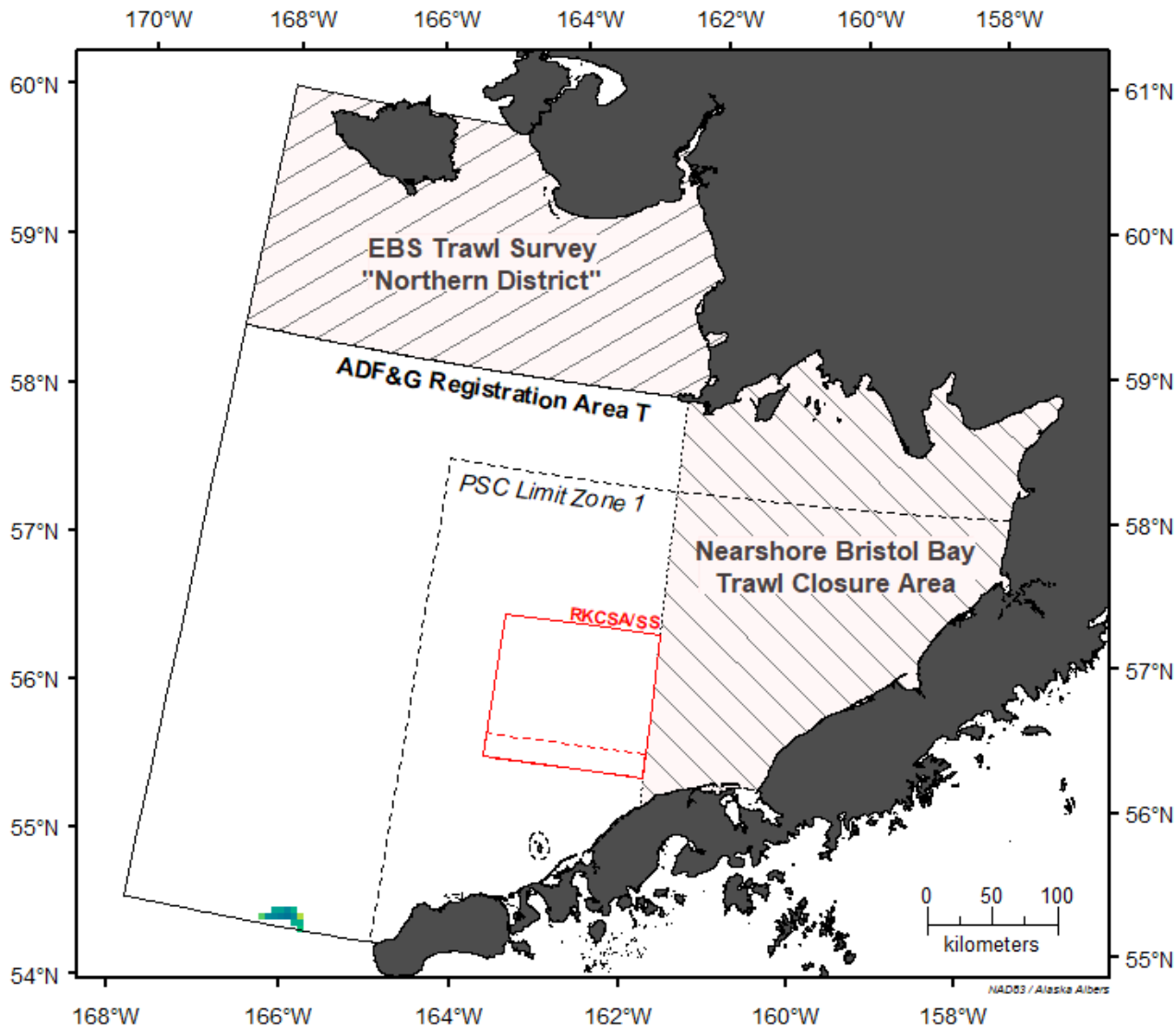
SA, km²



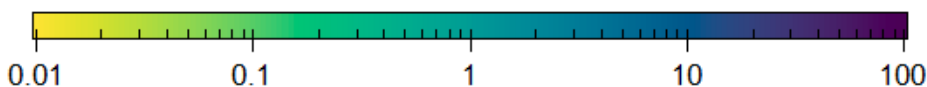
October 2020: Total Swept Area (SA), by PTR (3,590.7 km²)



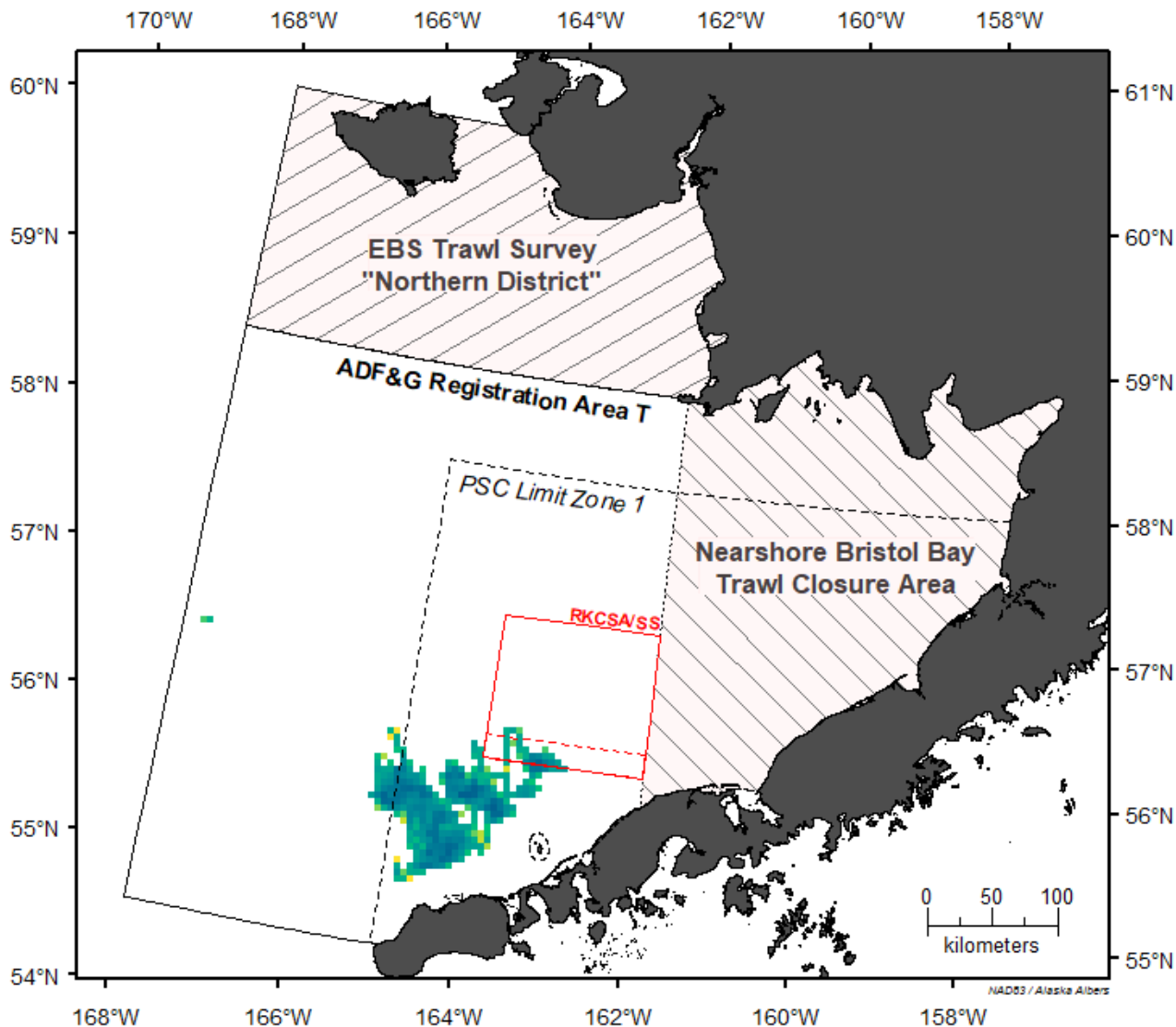
November 2020: Total Swept Area (SA), by PTR (19 km²)



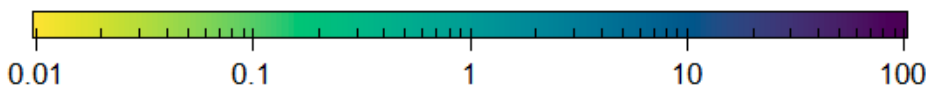
SA, km²



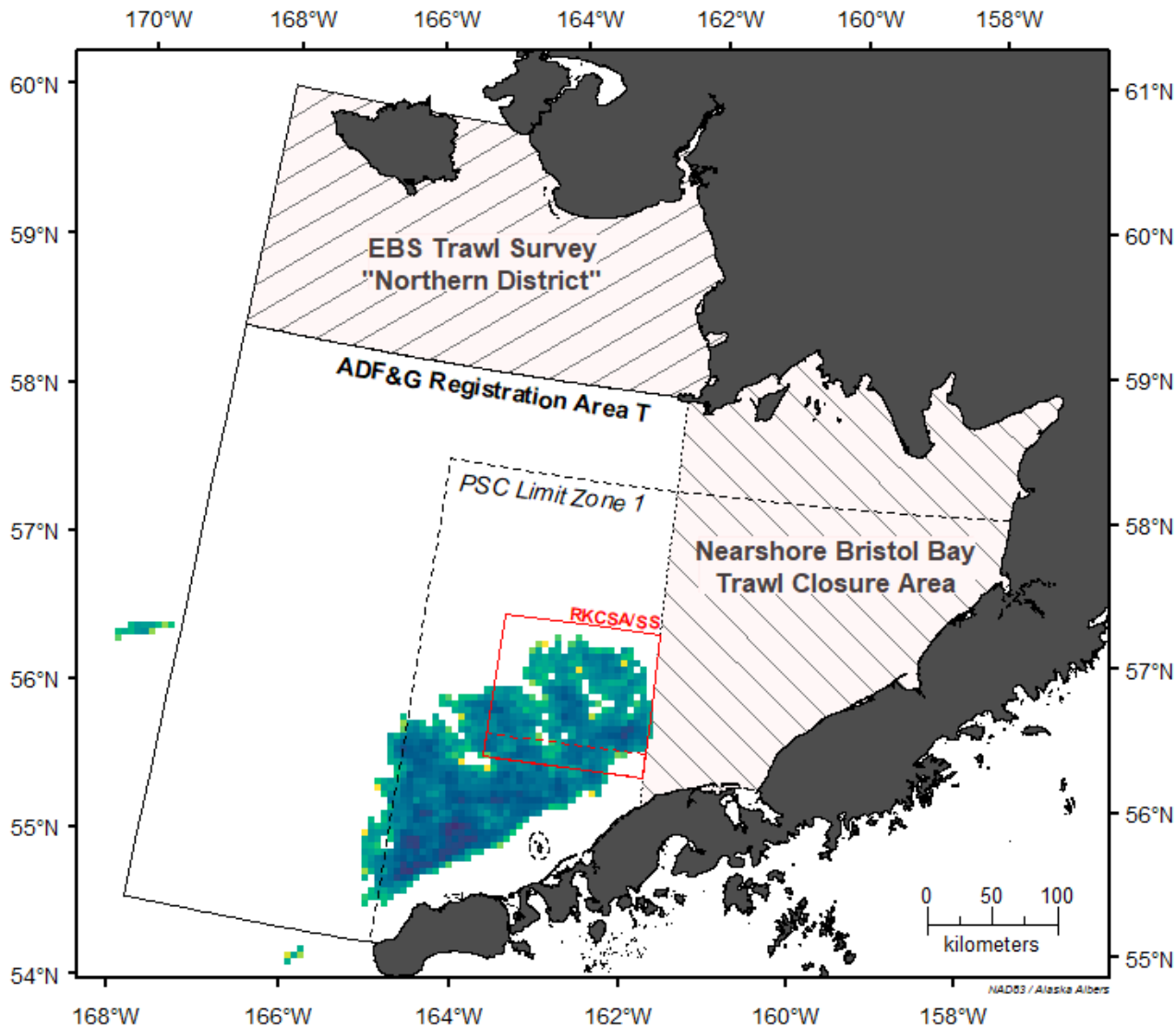
January 2021: Total Swept Area (SA), by PTR (1,154 km²)



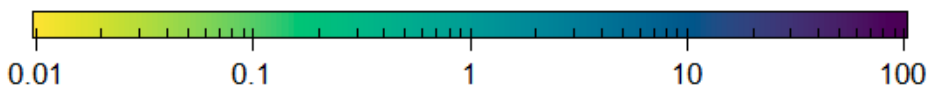
SA, km²



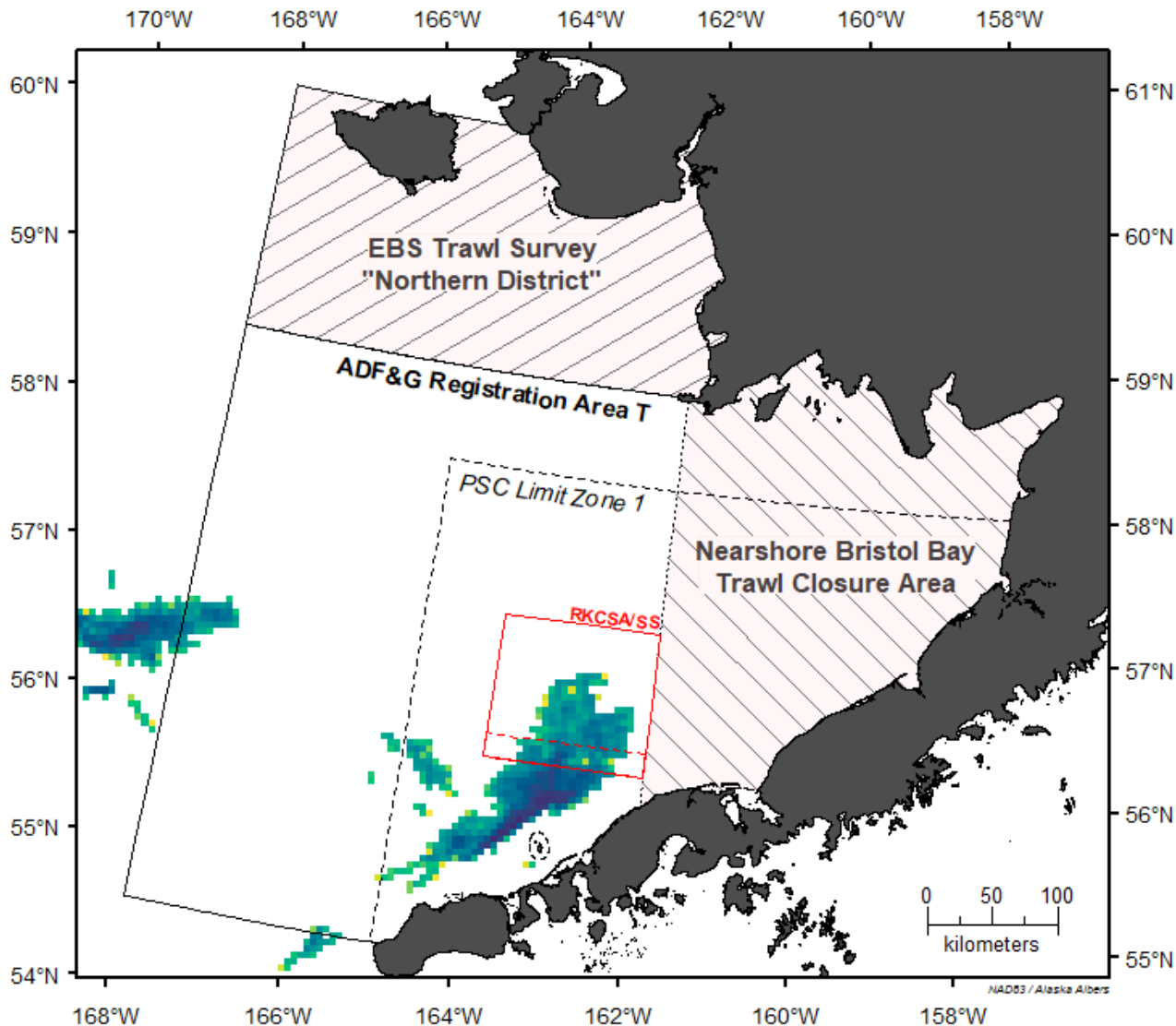
February 2021: Total Swept Area (SA), by PTR (9,078.7 km²)



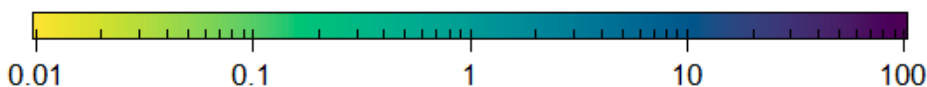
SA, km²



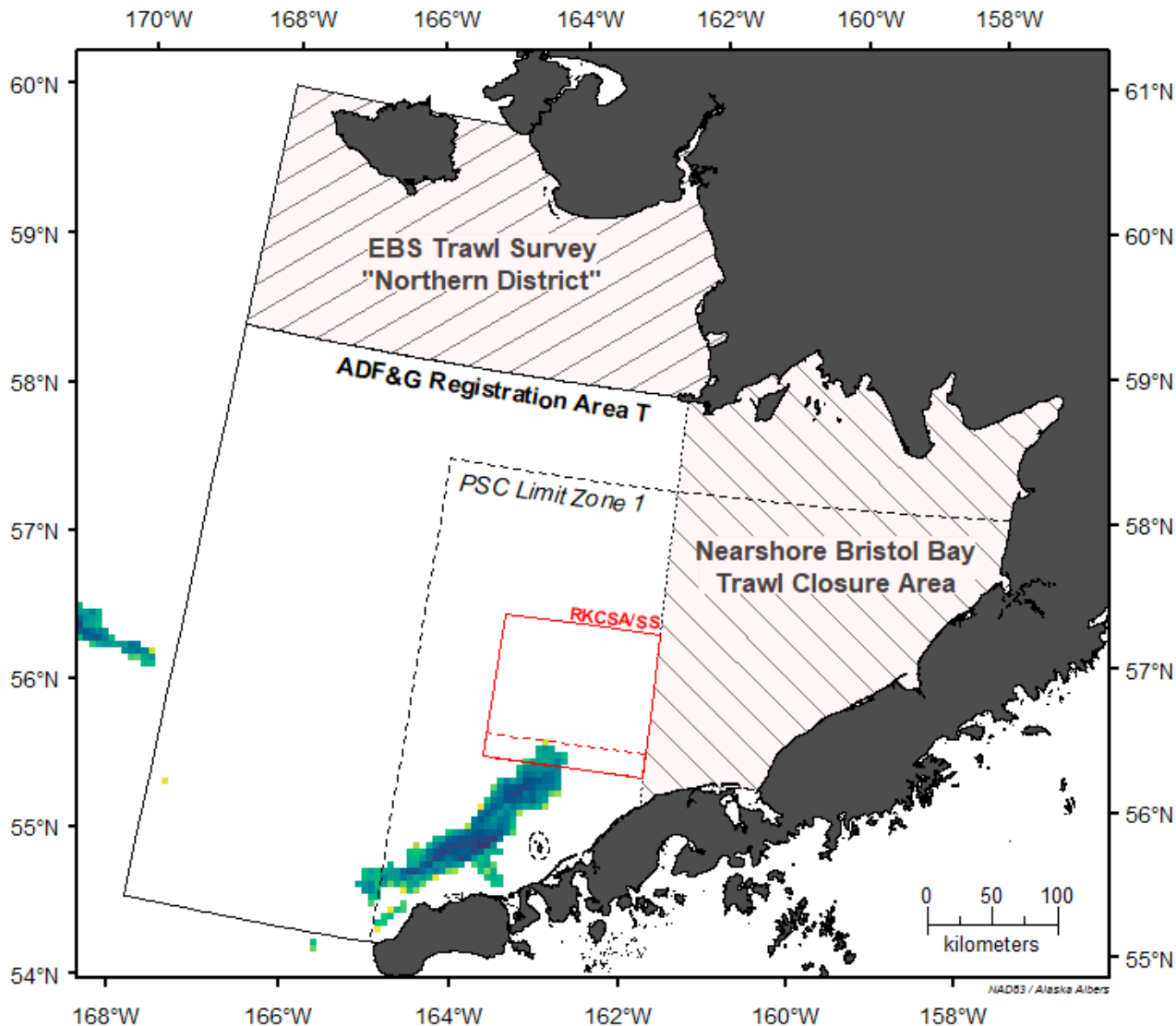
March 2021: Total Swept Area (SA), by PTR (4,668.9 km²)



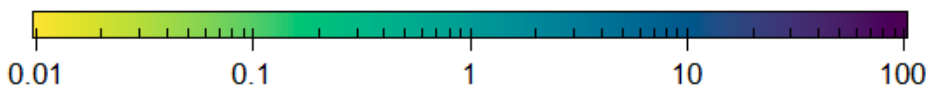
SA, km²



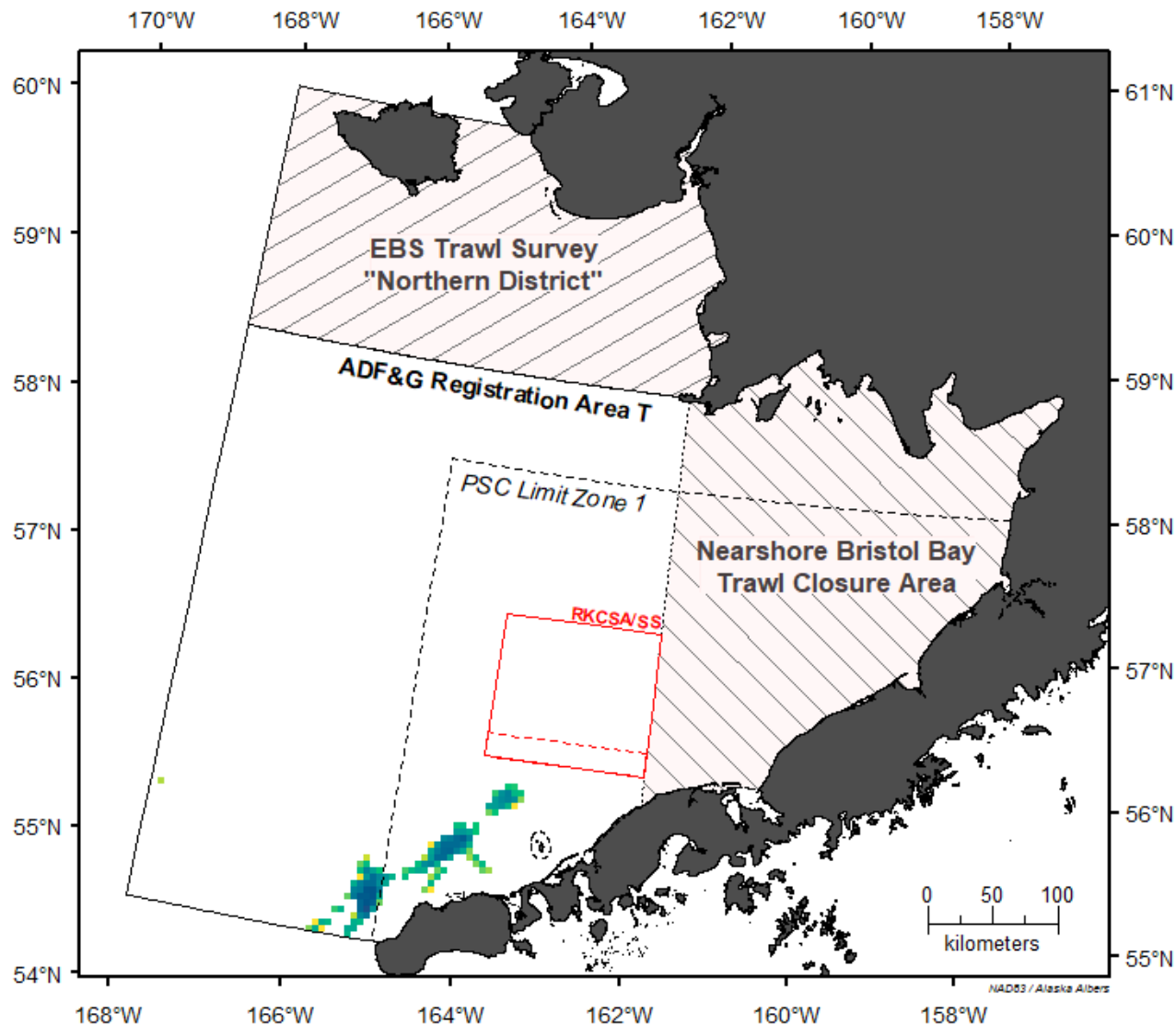
April 2021: Total Swept Area (SA), by PTR (2,005.6 km²)



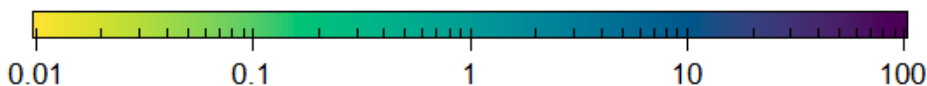
SA, km²



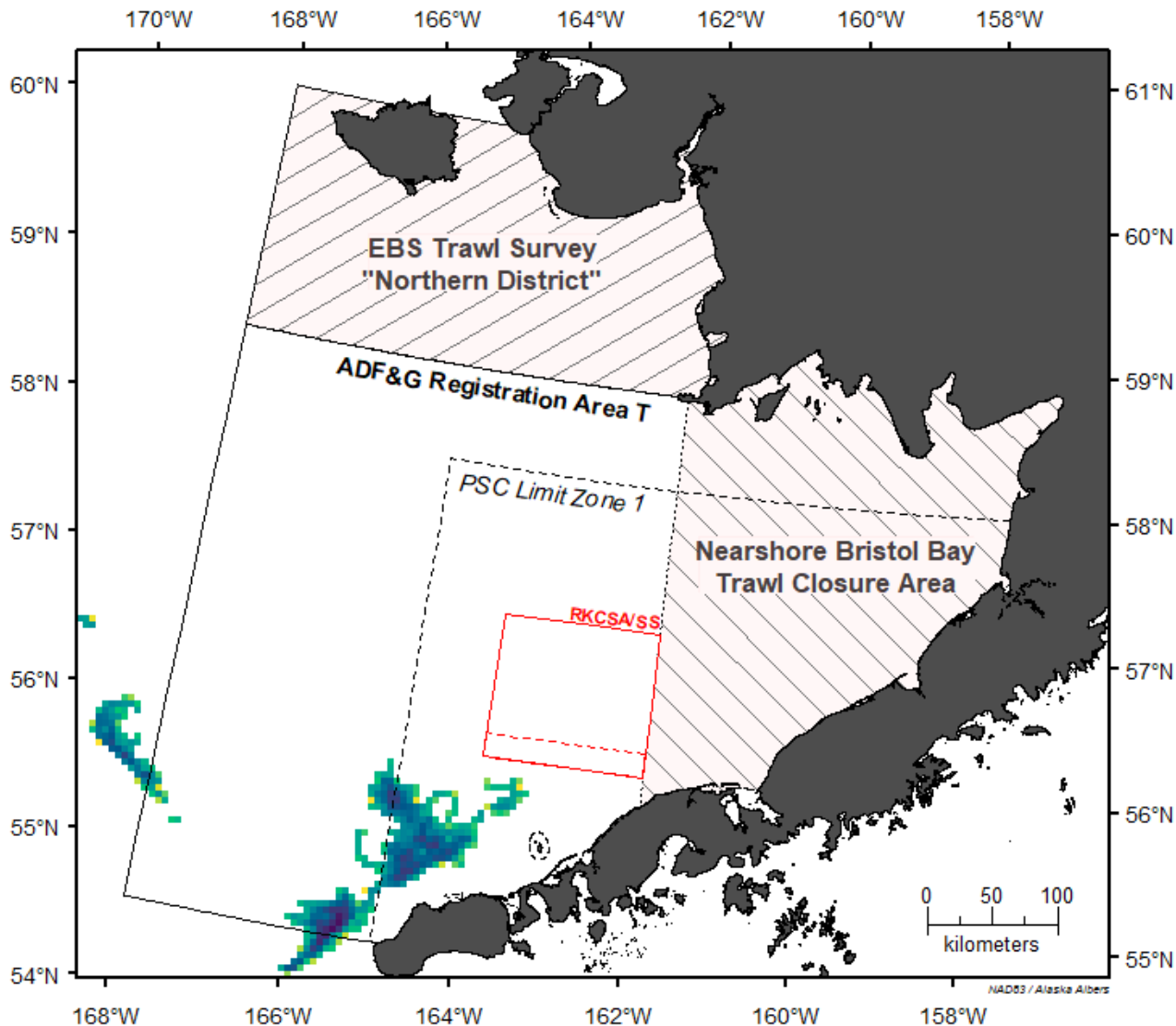
May 2021: Total Swept Area (SA), by PTR (375.3 km²)



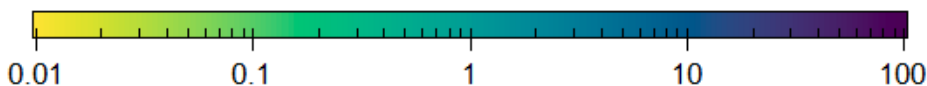
SA, km²



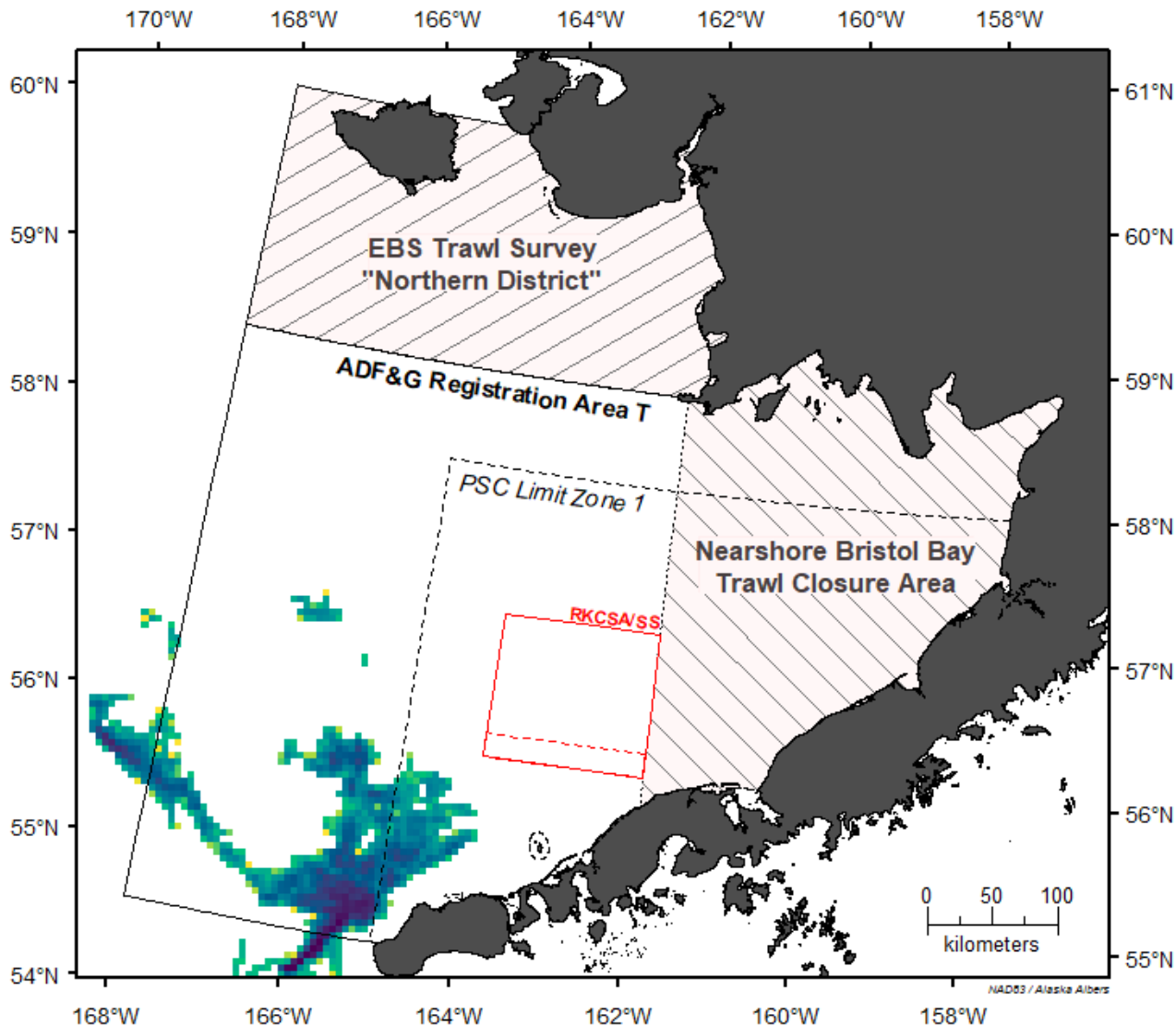
June 2021: Total Swept Area (SA), by PTR (2,544.4 km²)



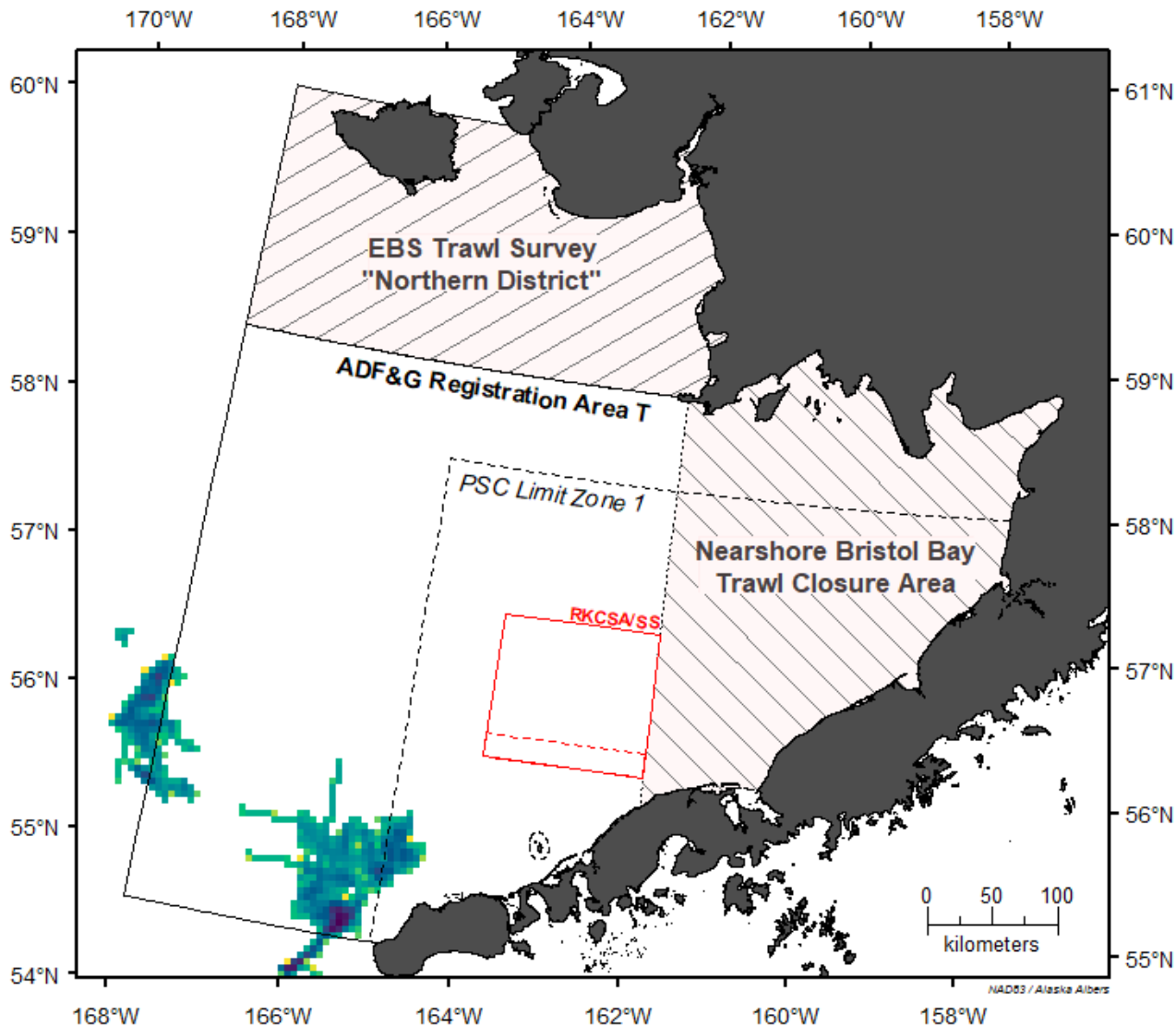
SA, km²



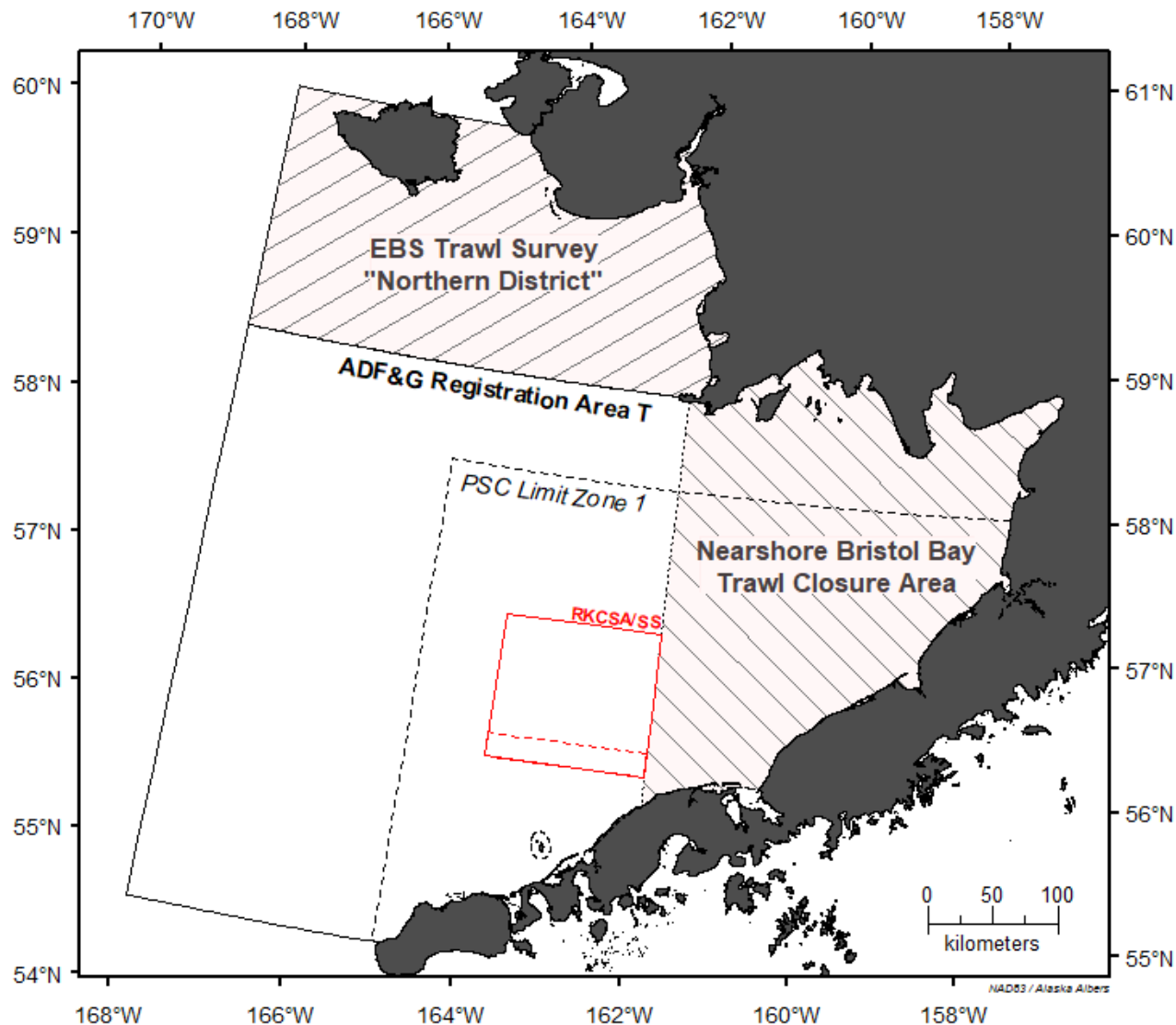
July 2021: Total Swept Area (SA), by PTR (5,246.7 km²)



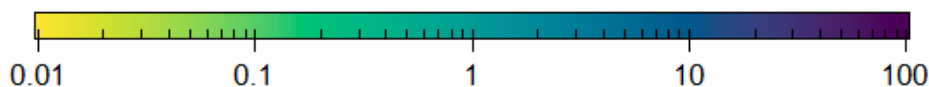
August 2021: Total Swept Area (SA), by PTR (1,651.6 km²)



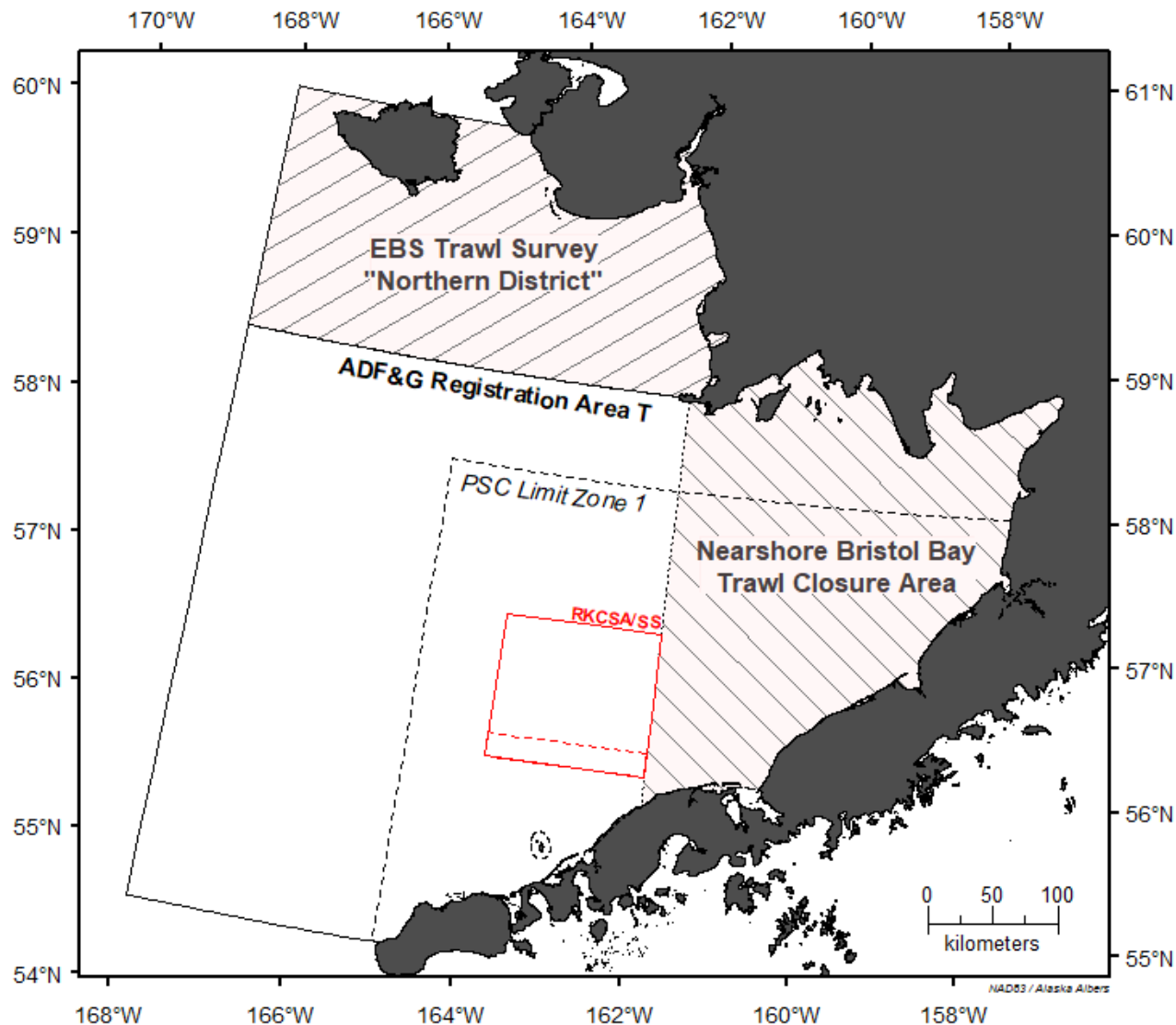
September 2021: Total Swept Area (SA), by PTR (0 km^2)



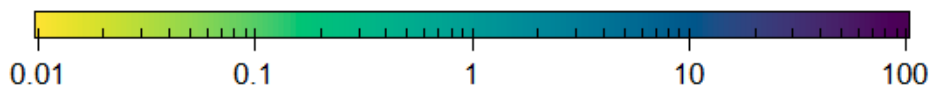
SA, km^2



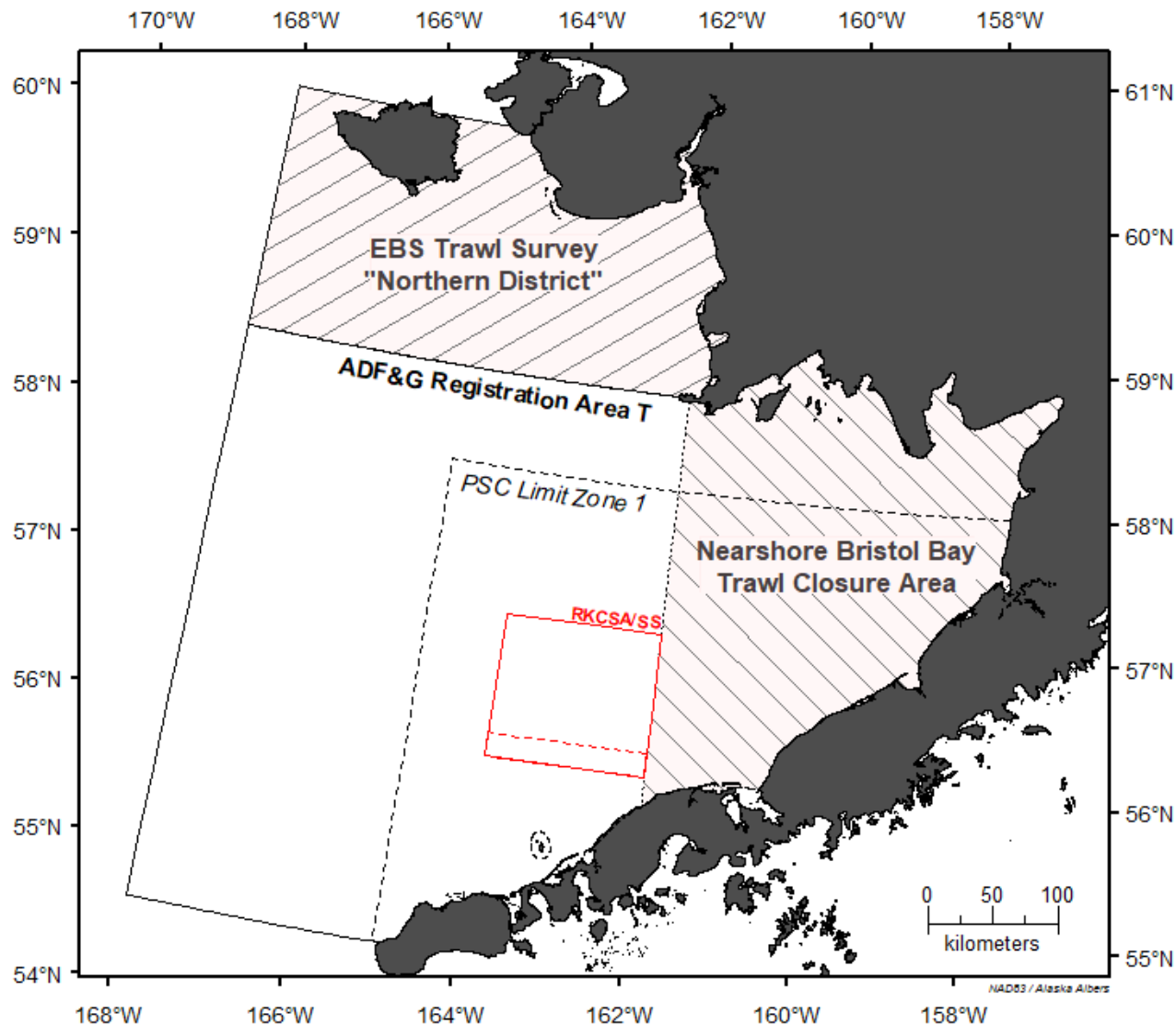
October 2021: Total Swept Area (SA), by PTR (0 km²)



SA, km²



November 2021: Total Swept Area (SA), by PTR (0 km²)



SA, km²

