Supplementary Information.

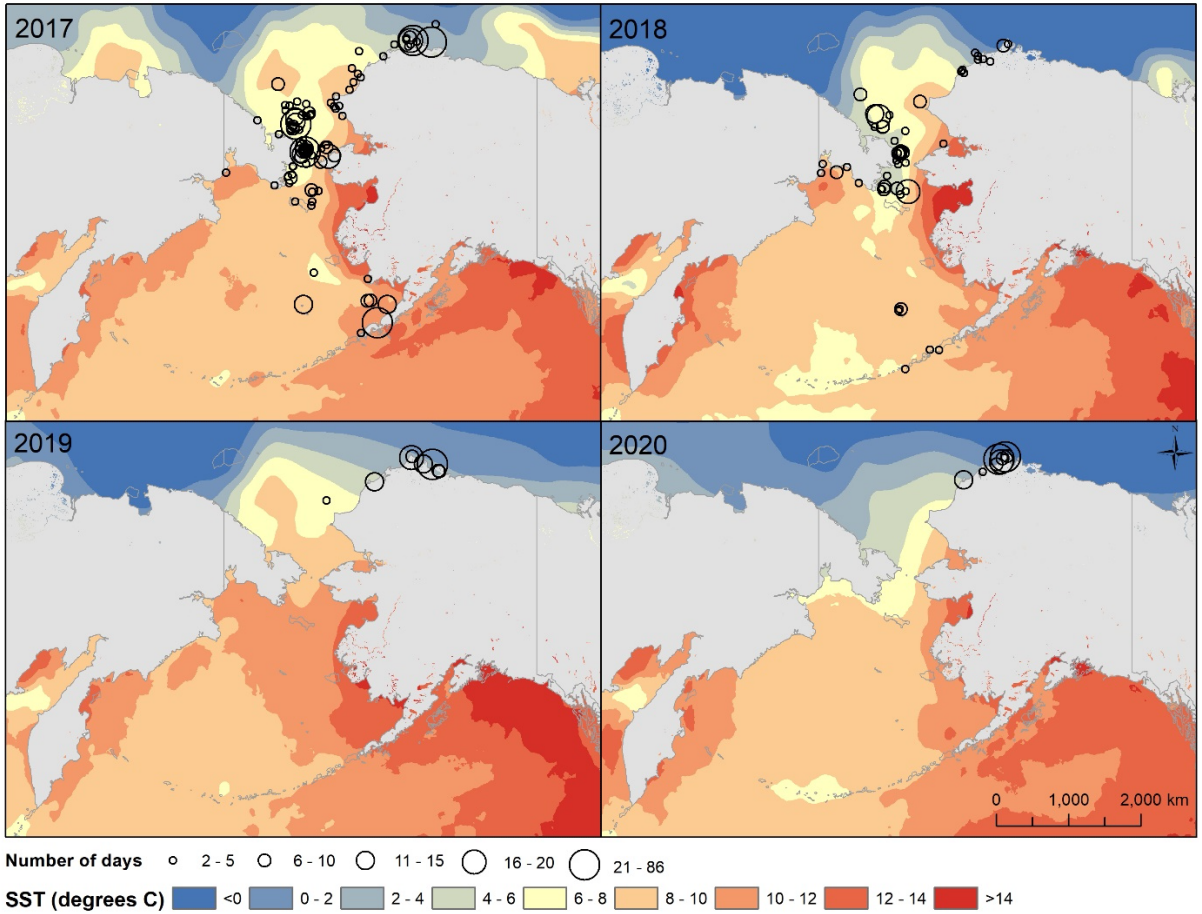

Figure S1. Mean sea surface temperatures (SST) in relation to Red Phalarope stopover areas (circles) in July from 2017–2020. Predicted locations were generated every 8 hours for individuals using continuous-time random walk state-space models; these locations were used to classify individual locations into a migrating or stopover state using hidden Markov models. Consecutive stopover locations were then combined to create stopover areas, depicted here as the mean center of all the points within a stopover area. The size of the stopover symbol depicts the number of days an individual spent within a stopover area before migrating again. Only stopover areas that were occupied (at least in part) in July are depicted.

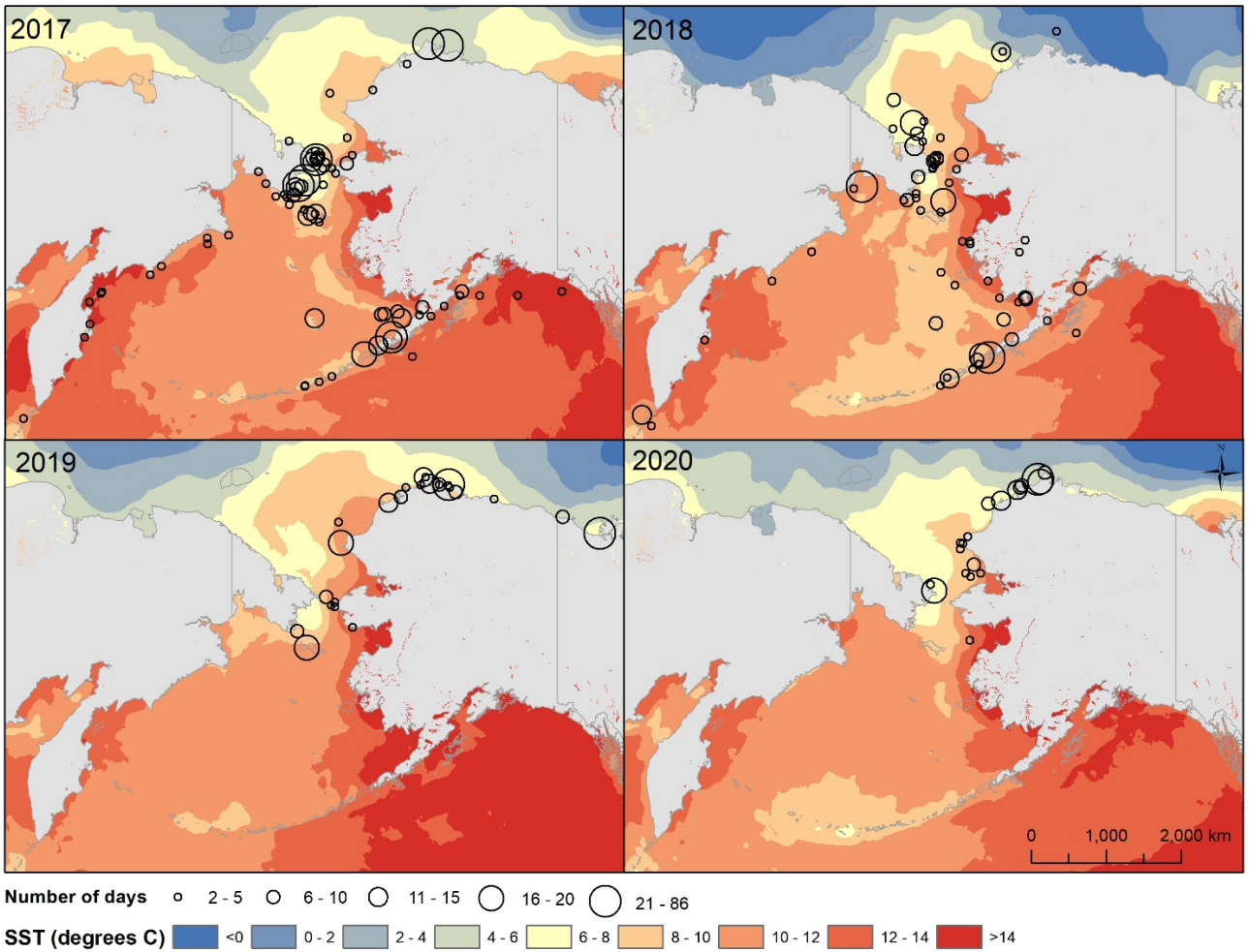

Figure S2. Mean sea surface temperatures (SST) in relation to Red Phalarope stopover areas (circles) in August from 2017–2020. Predicted locations were generated every 8 hours for individuals using continuous-time random walk state-space models; these locations were used to classify individual locations into a migrating or stopover state using hidden Markov models. Consecutive stopover locations were then combined to create stopover areas, depicted here as the mean center of all the points within a stopover area. The size of the stopover symbol depicts the number of days an individual spent within a stopover area before migrating again. Only stopover areas that were occupied (at least in part) in August are depicted.

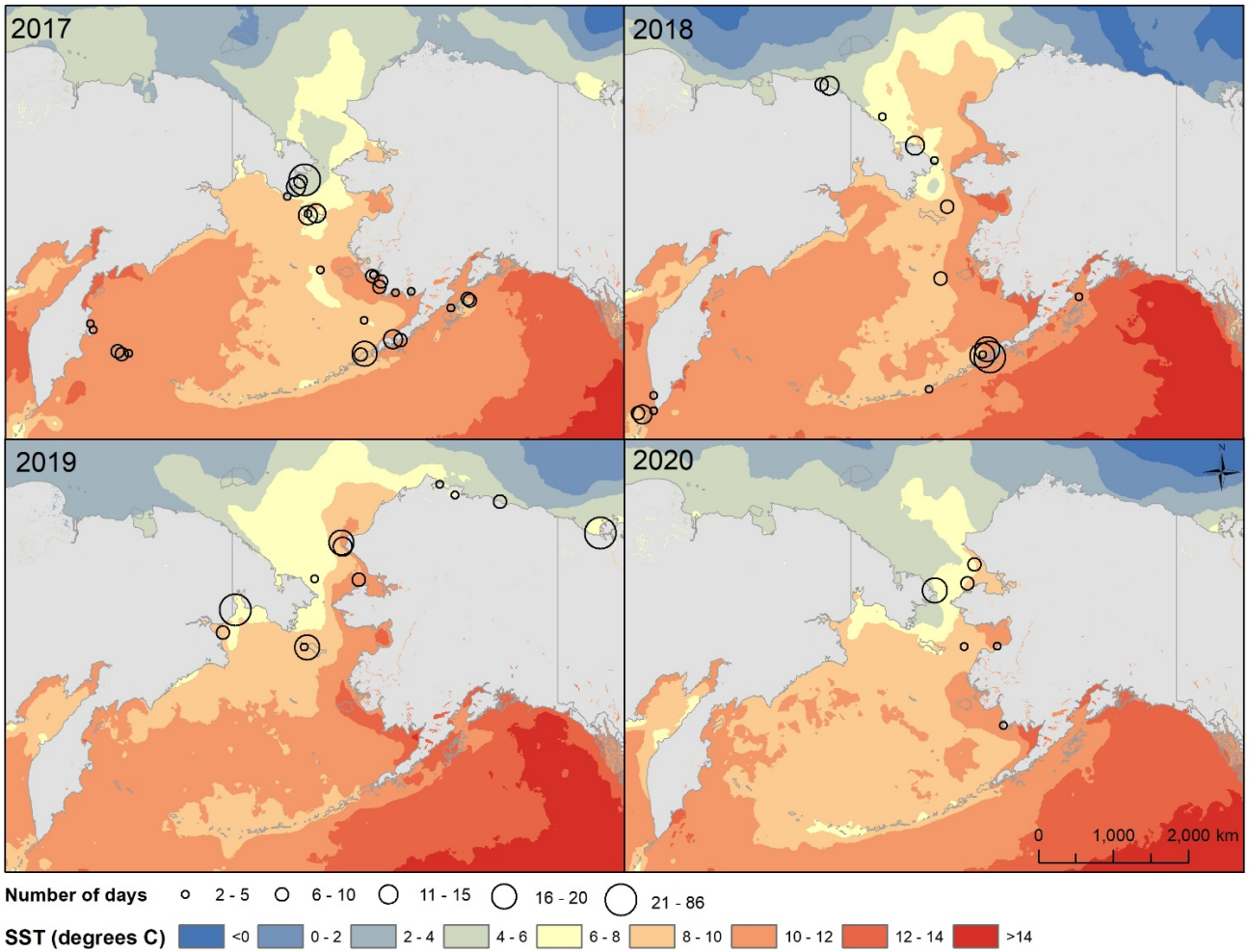

Figure S3. Mean sea surface temperatures (SST) in relation to Red Phalarope stopover areas (circles) in September from 2017–2020. Predicted locations were generated every 8 hours for individuals using continuous-time random walk state-space models; these locations were used to classify individual locations into a migrating or stopover state using hidden Markov models. Consecutive stopover locations were then combined to create stopover areas, depicted here as the mean center of all the points within a stopover area. The size of the stopover symbol depicts the number of days an individual spent within a stopover area before migrating again. Only stopover areas that were occupied (at least in part) in September are depicted.

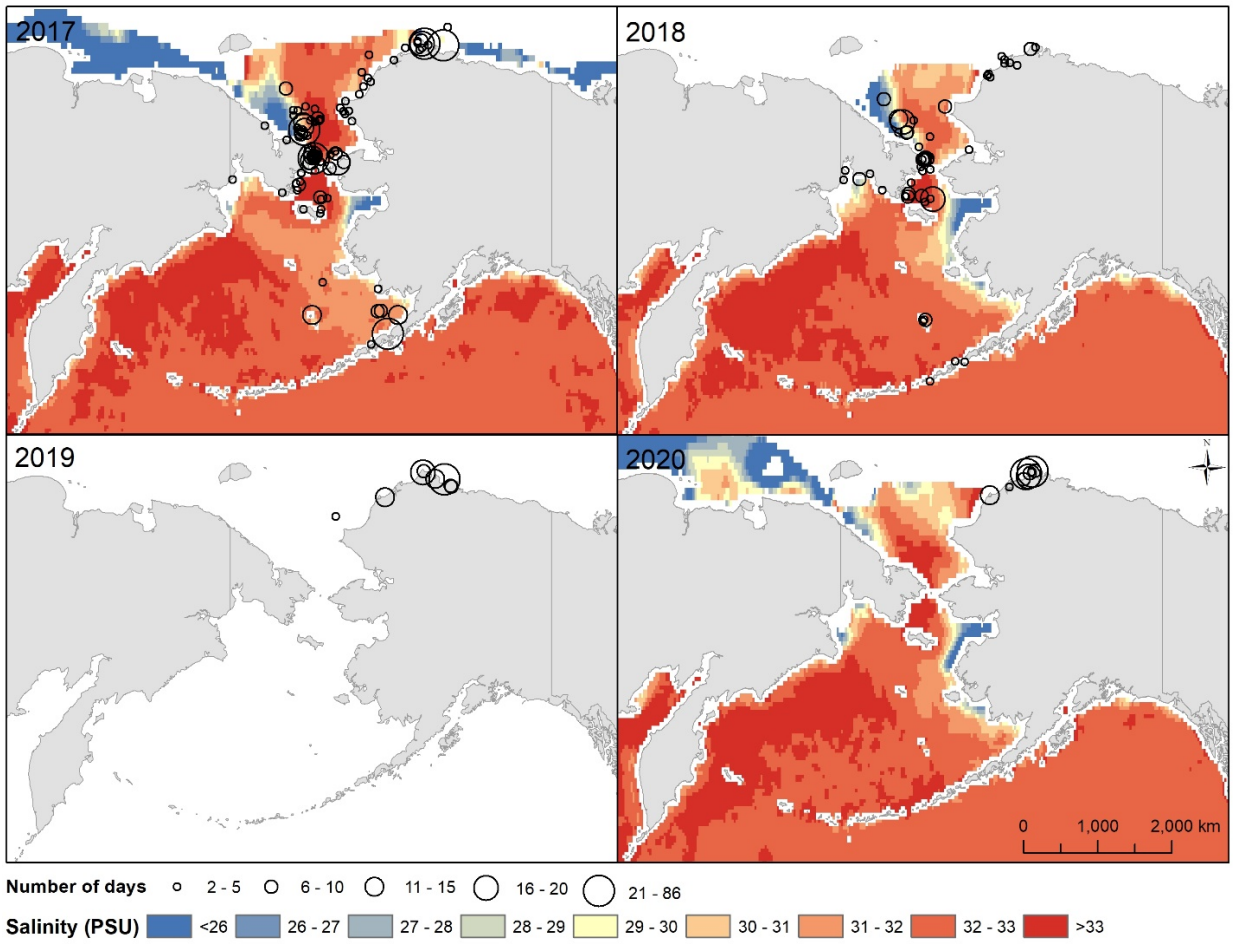

Figure S4. Mean ocean salinity in relation to Red Phalarope stopover areas (circles) in July from 2017–2020. Predicted locations were generated every 8 hours for individuals using continuous-time random walk state-space models; these locations were used to classify individual locations into a migrating or stopover state using hidden Markov models. Consecutive stopover locations were then combined to create stopover areas, depicted here as the mean center of all the points within a stopover area. The size of the stopover symbol depicts the number of days an individual spent within a stopover area before migrating again. Only stopover areas that were occupied (at least in part) in July are depicted. Areas in white away from land indicate missing data. No salinity data was available for July 2019 due to the Soil Moisture Active Passive (SMAP) instrument being down for an extended period of time.

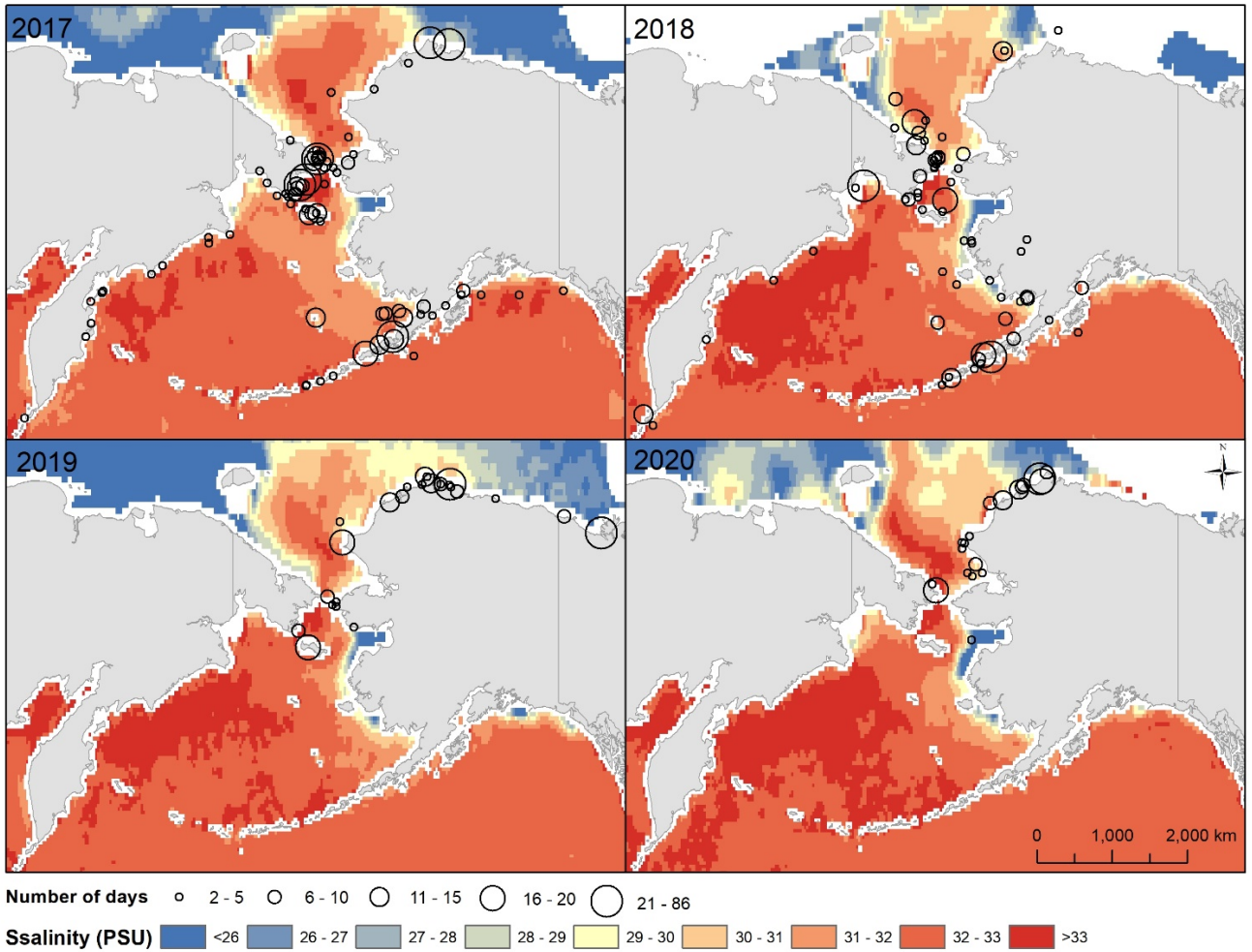

Figure S5. Mean ocean salinity in relation to Red Phalarope stopover areas (circles) in August from 2017–2020. Predicted locations were generated every 8 hours for individuals using continuous-time random walk state-space models; these locations were used to classify individual locations into a migrating or stopover state using hidden Markov models. Consecutive stopover locations were then combined to create stopover areas, depicted here as the mean center of all the points within a stopover area. The size of the stopover symbol depicts the number of days an individual spent within a stopover area before migrating again. Only stopover areas that were occupied (at least in part) in August are depicted. Areas in white away from land indicate missing data.

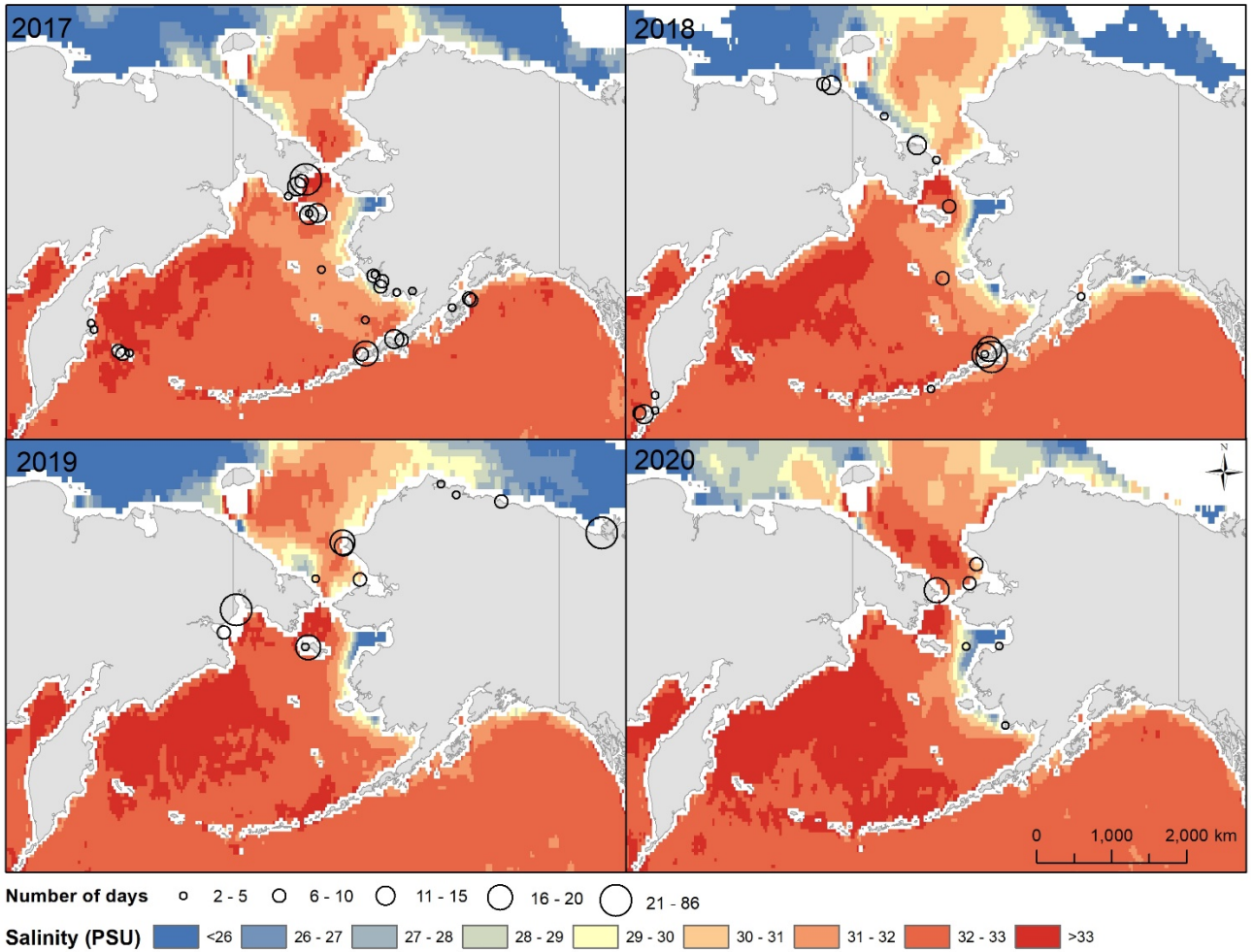

Figure S6. Mean ocean salinity in relation to Red Phalarope stopover areas (circles) in September from 2017–2020. Predicted locations were generated every 8 hours for individuals using continuous-time random walk state-space models; these locations were used to classify individual locations into a migrating or stopover state using hidden Markov models. Consecutive stopover locations were then combined to create stopover areas, depicted here as the mean center of all the points within a stopover area. The size of the stopover symbol depicts the number of days an individual spent within a stopover area before migrating again. Only stopover areas that were occupied (at least in part) in September are depicted. Areas in white away from land indicate missing data.

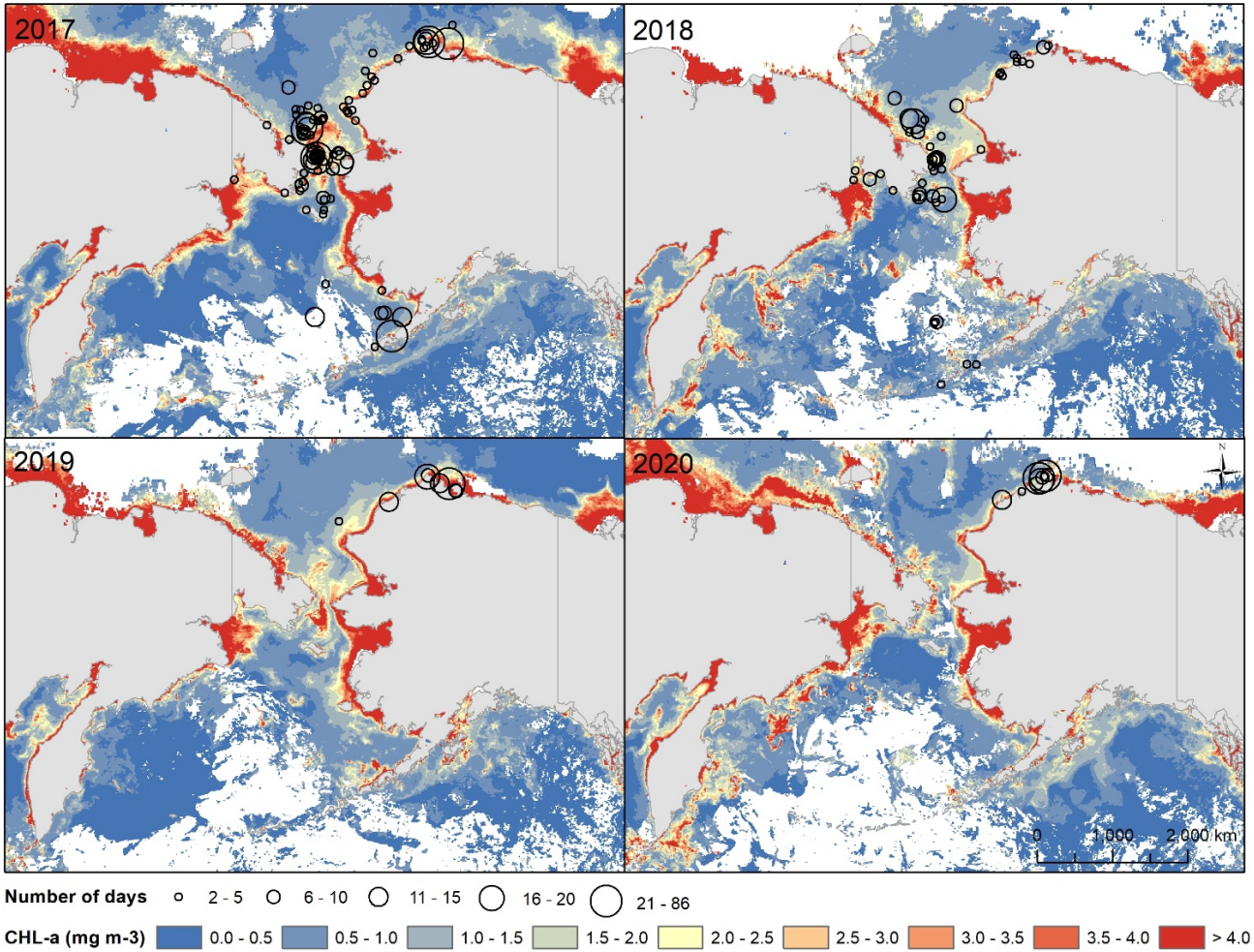

Figure S7. Mean chlorophyll-a concentration (CHL-a) in relation to Red Phalarope stopover areas (circles) in July from 2017–2020. Predicted locations were generated every 8 hours for individuals using continuous-time random walk state-space models; these locations were used to classify individual locations into a migrating or stopover state using hidden Markov models. Consecutive stopover locations were then combined to create stopover areas, depicted here as the mean center of all the points within a stopover area. The size of the stopover symbol depicts the number of days an individual spent within a stopover area before migrating again. Only stopover areas that were occupied (at least in part) in July are depicted. Areas in white away from land indicate missing data.

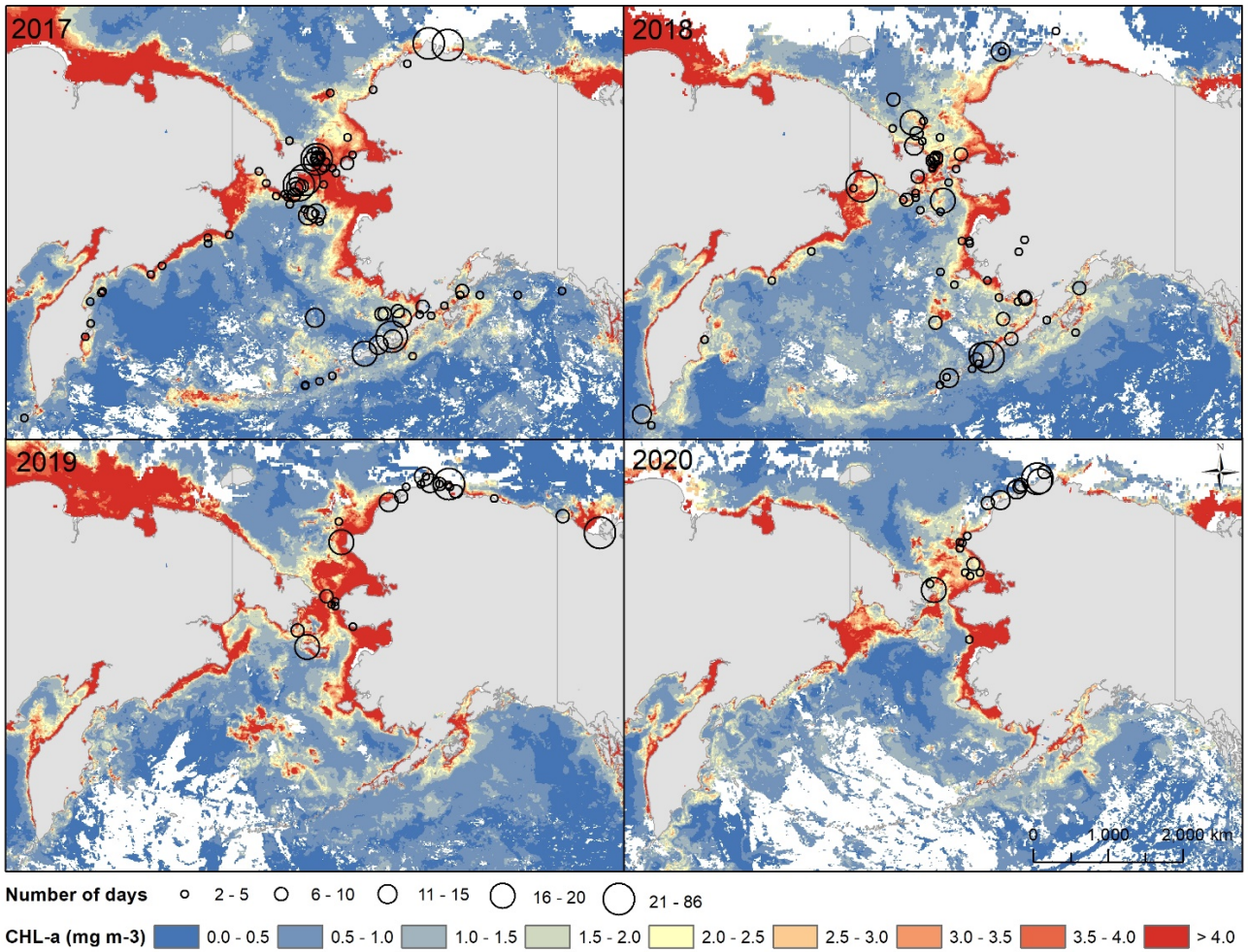

Figure S8. Mean chlorophyll-a concentration (CHL-a) in relation to Red Phalarope stopover areas (circles) in August from 2017–2020. Predicted locations were generated every 8 hours for individuals using continuous-time random walk state-space models; these locations were used to classify individual locations into a migrating or stopover state using hidden Markov models. Consecutive stopover locations were then combined to create stopover areas, depicted here as the mean center of all the points within a stopover area. The size of the stopover symbol depicts the number of days an individual spent within a stopover area before migrating again. Only stopover areas that were occupied (at least in part) in August are depicted. Areas in white away from land indicate missing data.

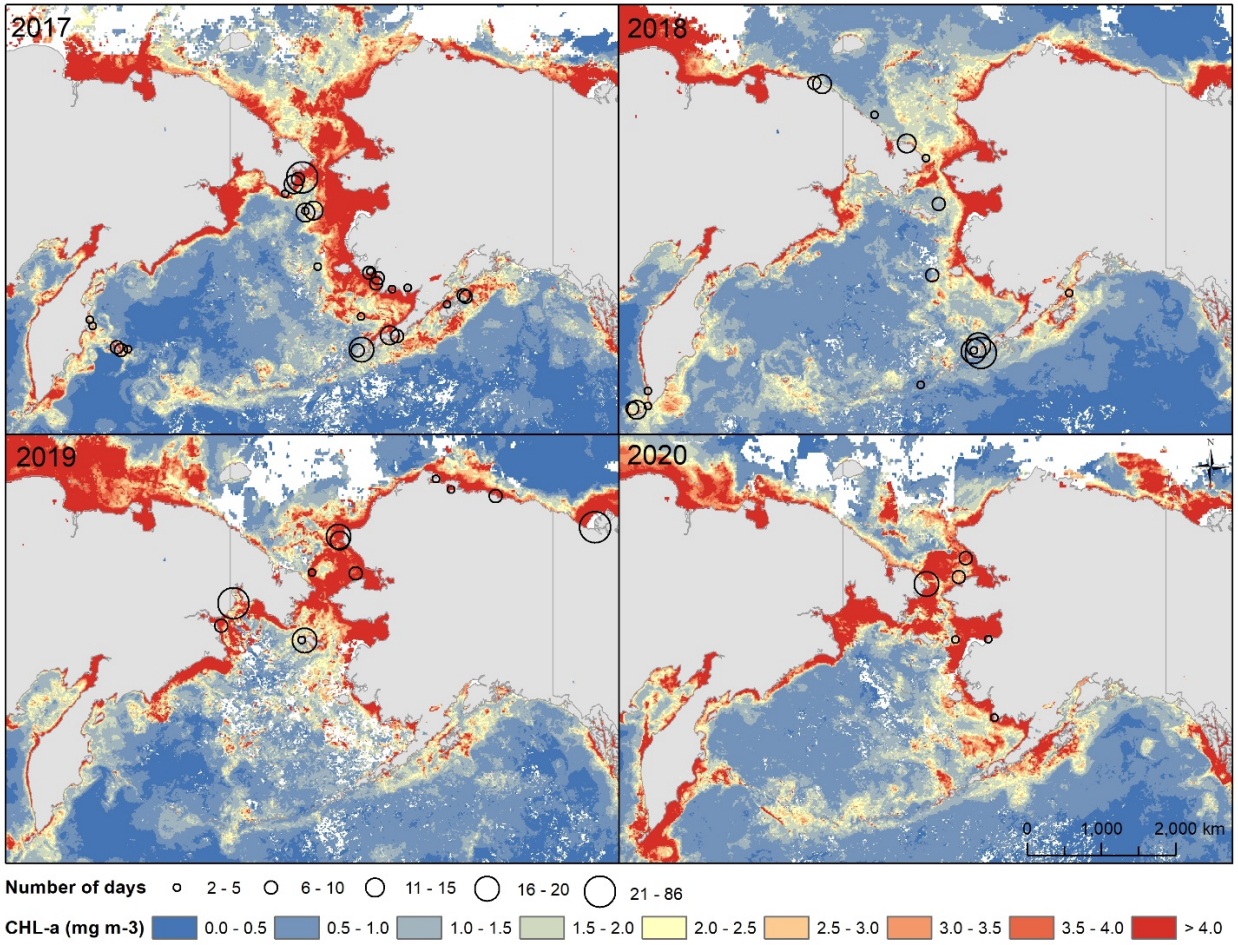

Figure S9. Mean chlorophyll-a concentration (CHL-a) in relation to Red Phalarope stopover areas (circles) in September from 2017–2020. Predicted locations were generated every 8 hours for individuals using continuous-time random walk state-space models; these locations were used to classify individual locations into a migrating or stopover state using hidden Markov models. Consecutive stopover locations were then combined to create stopover areas, depicted here as the mean center of all the points within a stopover area. The size of the stopover symbol depicts the number of days an individual spent within a stopover area before migrating again. Only stopover areas that were occupied (at least in part) in September are depicted. Areas in white away from land indicate missing data.

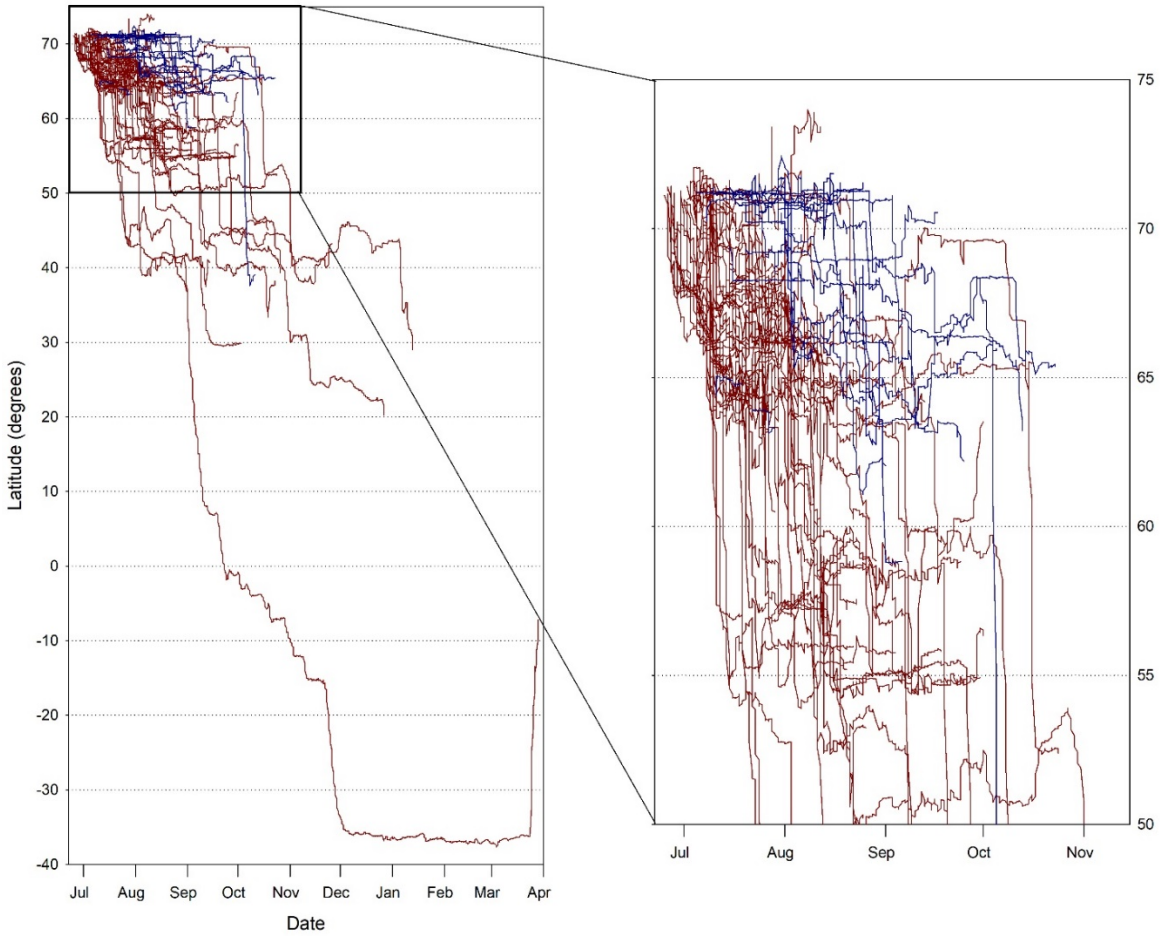

Figure S10. Latitude of female (red) and male (blue) Red Phalarope locations in relation to date (data from 2017–2020); inset map illustrates the Beringia region in more detail. Each line represents an individual and is based on predicted locations generated every 8 hours for individuals using continuous-time random walk state-space models.

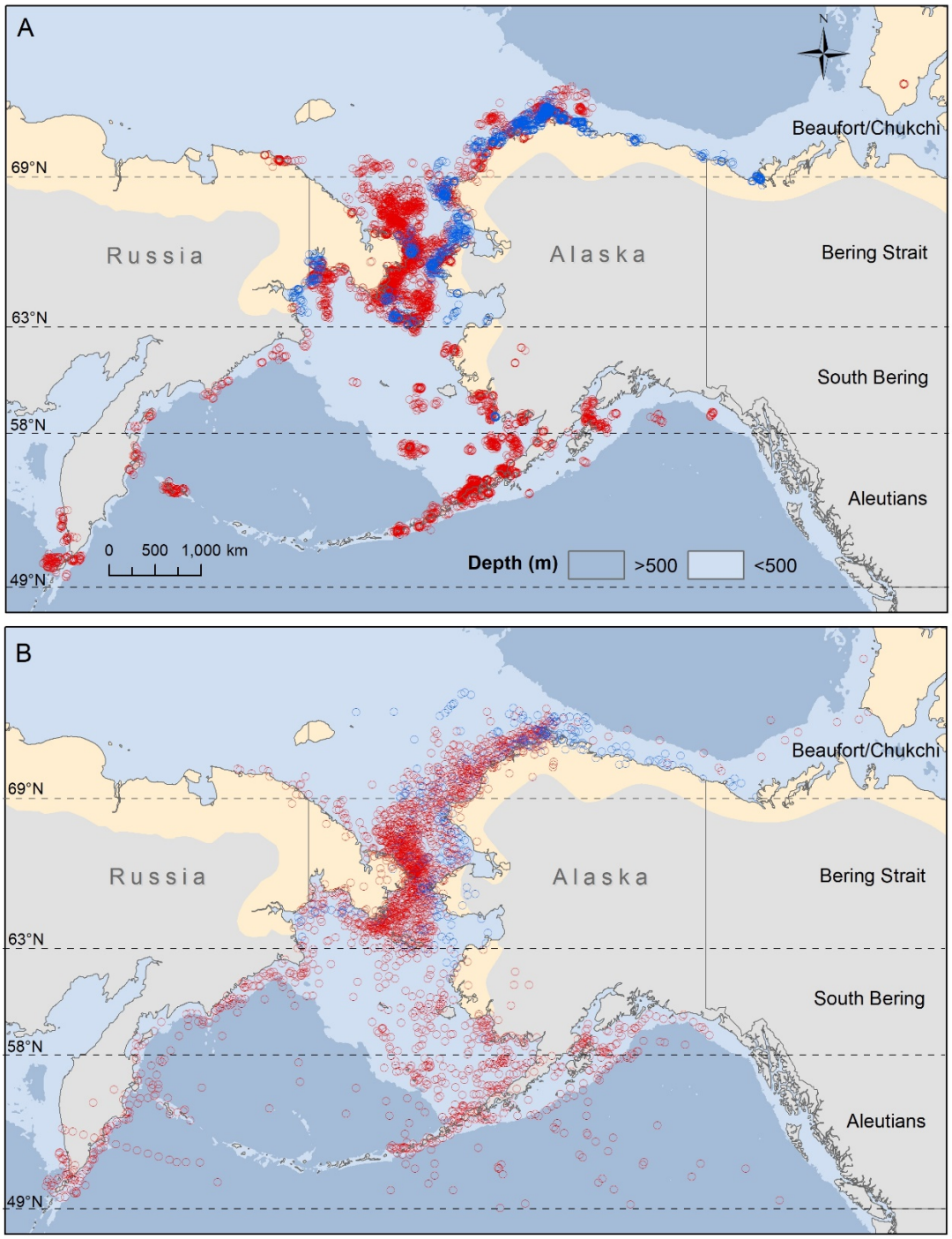

Figure S11. Stopover (A) and migrating (B) locations of 50 female (red dots) and 17 male (blue dots) Red Phalaropes within four regions (separated by dashed latitudinal lines with names on the right) in Beringia. Activity states were classified by hidden Markov models using predicted locations generated every 8 hours using continuous-time random walk state-space models for individuals during southward migration (data from 2017–2020). Red Phalarope breeding areas (yellow shading) are from BirdLife International and Handbook of the Birds of the World (2021). Bathymetry (blue shading) from Becker et al. (2009).