Walrus tracking and telemetry data acquired from walruses instrumented on sea ice in the southern Chukchi Sea, June 2009

Field Radio-Tagging Report

USGS Alaska Science Center, Walrus Research Project

Background:

The vast majority of female and young Pacific walruses summer in the Chukchi Sea. The Department of Interior's Minerals Management Service has offered an offshore lease sale in the Chukchi Sea that encompasses almost the entire summering grounds of female and young walruses within U.S. waters. Lease considerations and mitigation policies in the Chukchi Sea lease sale planning area require information on the distribution of walruses, their use of important foraging areas, and dependence on sea ice habitats. USGS has begun a study to better understand the distribution of walruses and their use of important foraging areas and sea ice habitats within Chukchi Sea. Results of the study will provide the public, subsistence users, and managers with a greater understanding of walrus habitat use patterns in the Chukchi Sea.

Methods:

Between 2009 June 6 and 8, we attached satellite radio-tags to 34 walruses as they rested on sea ice on their northward migration into the Chukchi Sea near the southern boundary of the lease sale area. We deployed radio-tags with crossbows from skiffs launched off the 115-foot research vessel Norseman II (Jay et al 2006). All radio tags transmitted hourly haulout and foraging behavior status along with the signals used to estimate locations (Telonics LPT-125 manufactured by Telonics of Mesa, Arizona) and were fit with standard sub-dermal anchors (Jay et al 2006). The Argos satellite data collection system provided records of transmissions received by polar orbiting satellites and estimated geographic locations of tagged walruses based on the transmission Doppler shifts recorded by instruments onboard satellites receiving the transmission signal (Argos 2007). Because locations derived from Doppler shift data suffer variable inaccuracies, we filtered locations with a plausibility test based on reported quality of the location estimate, the nominal maximum walrus swim speed, spatial redundancy, and turn angles (see Udevitz et al. 2009 for details).

Results:

All 34 deployed transmitters returned data through the satellite data collection system (Table 1). Tracking data revealed the path of tagged walruses (Figure 1). A minority of the tagged walruses (10 of 34) moved from the deployment region to the west into Russian waters within a week of deployment. The remaining tagged walruses remained in US waters for the majority of the deployment durations. Tagged walruses remained over continental shelf waters throughout the summer long after sea ice had disappeared from the Chukchi Sea continental shelf (Figure 2). The tags provided 1296 walrus-days of haulout and foraging behavioral data.

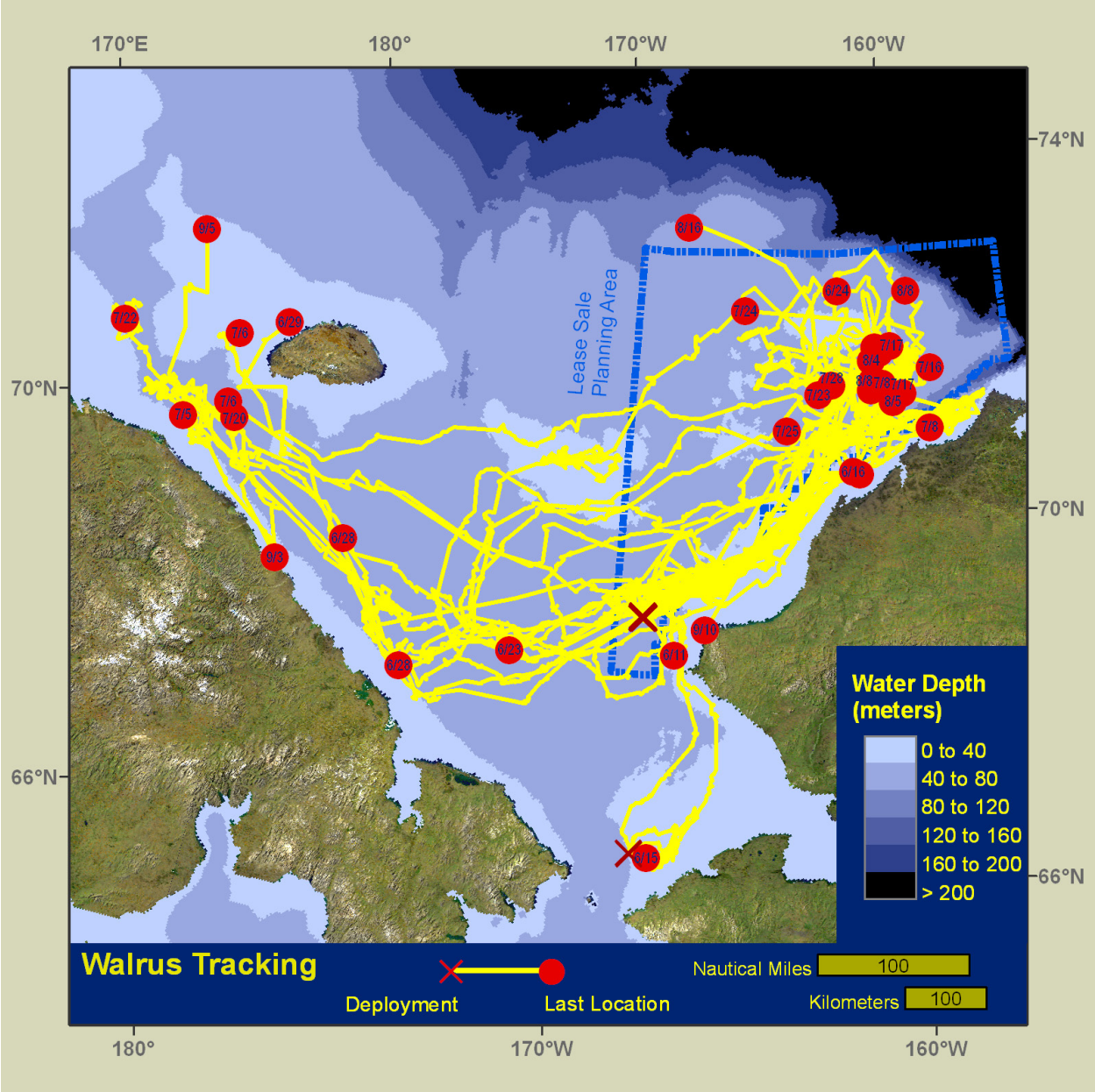

Figure 1. Tracks of walruses instrumented during the 2009 Norseman II cruise.

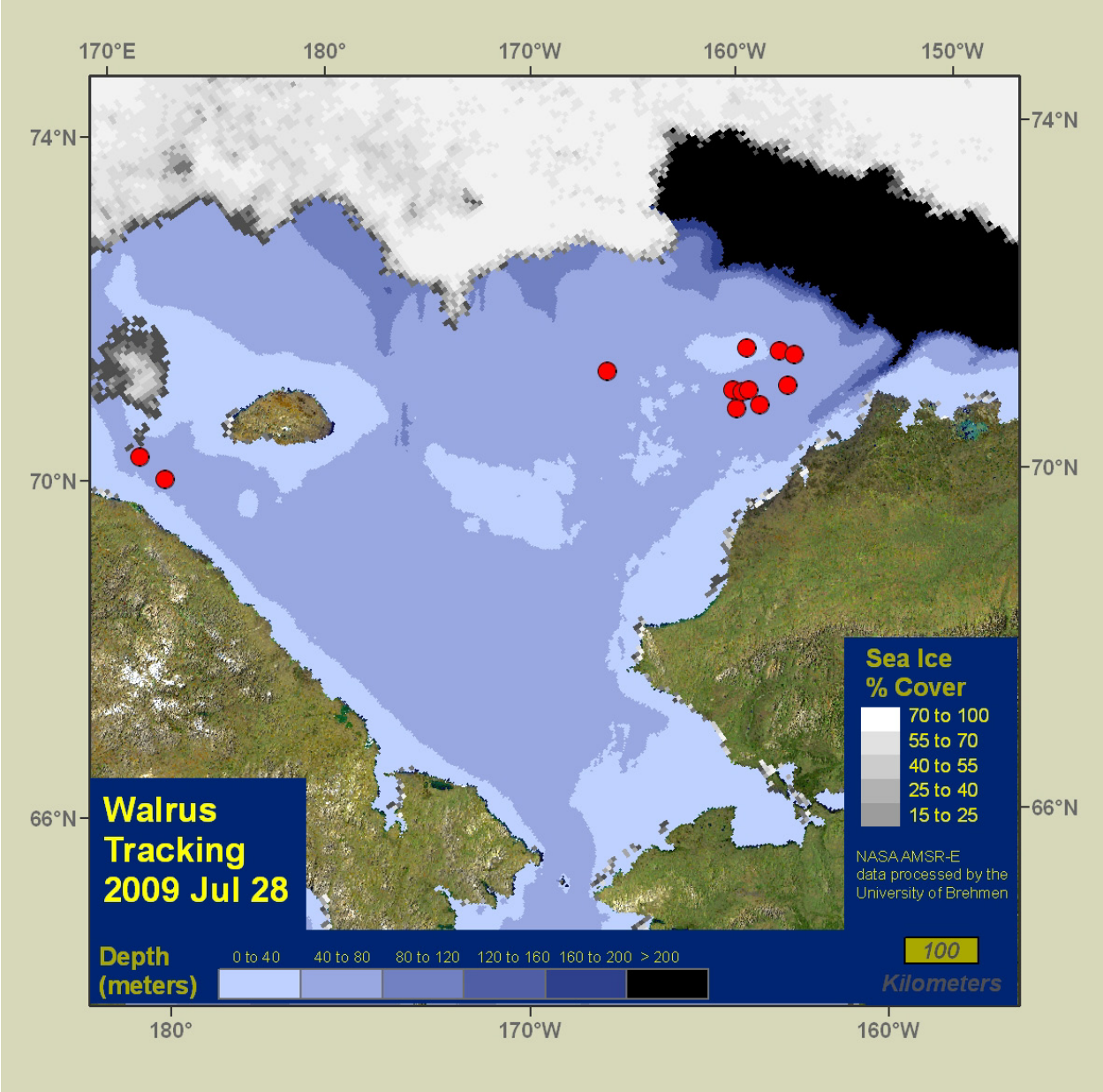

Figure 2. Late summer location of tracked walruses and sea ice imaged by passive microwave (AMSR-E data collected by NASA and processed by the University of Bremen, Spreen et al. 2009).

Table 1. Summary of data acquired by satellite-linked radio tags deployed on walruses in the southern Chukchi Sea, 2009.

Radio Model	Number o f Deployments	Data Collection	Days of Tracking Data (Mean and Standard Error)	Locations per day (Mean and Standard Error)
Telonics LPT-125	34	Tracking Hourly haulout and forage behavior	39.9 (8.0) d Range 3.2 – 88.9	14.6 (3.3)

References

Argos. 2007. Argos User's Manual. Collecte Localisation Satellites. Argos, Saint-Agne, France.

Jay, C. V., M. P. Heide-Jorgensen, A. S. Fischbach, M. V. Jensen, D. F. Tessler, and A. V. Jensen, 2006. Comparison of remotely deployed satellite radio transmitters on walruses. Marine Mammal Science 22:226-236.

Spreen, G., L. Kaleschke, and G. Heygster. 2007. Sea ice remote sensing using AMSR-E 89 GHz channels. Journal of Geophysical Research 113:C02S03.

Udevitz, M. S., C. V. Jay, A. S. Fischbach, and J. L. Garlich-Miller. 2009. Modeling Haul-out Behavior of Walruses in Bering Sea Ice. Canadian Journal of Zoology 87:1111-1128.