

Dall's Sheep Monitoring in NPS ARCN and CAKN – FY11

In FY11, the NPS Arctic (ARCN) and Central Alaska (CAKN) Inventory and Monitoring Networks collaborated to survey the Itkillik Preserve of northeastern Gates of the Arctic NP&Pres (GAAR); Western Arctic Parklands (WEAR = Noatak NPres [NOAT], Kobuk Valley NP [KOVA], Cape Krusenstern NM [CAKR]); Denali NP&Pres (DENA) and southern Wrangell-St. Elias NP&Pres (WRST) using distance sampling methods to estimate the abundance and sex and age composition of Dall's sheep in these park units.

The Itkillik survey was conducted from July 3-6 by one pilot-observer team that flew 18 hours completing 39 20-km long transects centered on an 8-km grid across the 2,542 km² (980 mi²) survey area (Figure 1). The survey team observed 48 groups totaling 208 sheep on transect: 55% were ewe-like (ewes, yearlings, rams \leq ¼ curl), 24% lambs, 21% rams (2% of observed sheep were rams full-curl or greater) and 0% unclassified. Observed ratios of lambs/100 ewe-like and rams/100 ewe-like were 43.5 and 37.4, respectively. Survey cost: \$10,400

The WEAR survey was conducted from July 7-10 by five pilot-observer teams that flew 125 hours and completed 215 of 222 transects that were 20 km in length and were centered on a 7.5-km grid across available sheep habitat in NOAT, northern KOVA and a small portion in CAKR (survey area 15,222 km², 5877 mi²) as well as another 45 transects that were 15 km in length and were centered on a 6-km grid in the western Baird Mountains area of southwestern NOAT (1,842 km², 711 mi²) (Figure 2). We observed 104 groups totaling 338 sheep on transect in WEAR: 61.5% were ewe-like, 19.2% lambs, 19.2% rams (2.4% of observed sheep were rams full-curl or greater) and 0% unclassified. Observed ratios of lambs/100 ewe-like and rams/100 ewe-like were 31.3 and 31.3, respectively. In the western Baird Mountains only, we observed 17 groups totaling 96 sheep: 69.8% ewe-like, 16.7% lambs, 13.5% rams (1 observed ram was full-curl or greater) and 0% unclassified. Observed ratios of lambs/100 ewe-like and rams/100 ewe-like were 23.9 and 19.4, respectively. Total survey cost: \$51,000

The DENA survey was conducted from July 20-21 by two pilot-observer teams that flew 32 hours and completed 84 transects that were 15 km in length and were centered on a 7-km grid across the 4,083 km² (1,577 mi²) survey area (Figure 3). We observed 65 groups totaling 311 sheep on transect: 53% were ewe-like, 14% lambs, 33% rams (7% of observed sheep were rams full-curl or greater) and 0% unclassified. Observed ratios of lambs/100 ewe-like and rams/100 ewe-like were 26.7 and 61.8, respectively. Survey cost: \$8,000

The southern WRST survey was conducted from July 25 to August 2 by three pilot-observer teams that flew 65 hours on July 27, 28 and 30, completing 128 of the 172 remaining transects from the 2010 survey. The transects were 20 km in length and were generated with their center points on a 9.5-km grid across a ~26,850 km² (10,365 mi²) survey area encompassing available sheep habitat within WRST as a whole (Figure 4). Survey teams observed 82 groups totaling 429 sheep on transect: 57.8% were ewe-like, 19.3% were lambs, 22.8% were rams (5.1% of observed sheep were rams full-curl or greater) and 0% were unclassified. Observed ratios of lambs/100 ewe-like and rams/100 ewe-like were 33.5 and 39.5, respectively. Survey cost: \$42,000

Data from the 2011 surveys and the 2010 northern WRST survey are currently being analyzed. Results from the 2009 and 2010 surveys conducted in GAAR as a means to test these methods were presented at the 2011 George Wright Society meeting (New Orleans) in March. We also submitted a manuscript that will be published in an upcoming edition of the *Journal of Wildlife Management* regarding the development of the survey methods and the hierarchical models used to generate the estimates for those two surveys. We estimated 8,412 sheep (95% CI 6,517–11,090) in GAAR in 2009 and 10,072 sheep (95% CI 8,081–12,520) in 2010. Abundance within the Itkillik Preserve area was 1,898 (95% CI: 1,421–2,578) and 1,854 (95% CI: 1,342–2,488) in 2009 and 2010, respectively. The distance sampling surveys were feasible logistically, cost 70–80% less than the traditionally used minimum count surveys, and produced precise estimates of sheep abundance. Monitoring protocols are in draft form and will be available by the end of calendar year 2011.

Observed Dall's sheep numbers from distance sampling surveys conducted by the NPS in Wrangell-St. Elias National Park and Preserve, Alaska, 2010 and 2011

The NPS Arctic and Central Alaska Networks surveyed Dall's sheep using distance sampling methods in Gates of the Arctic National Park and Preserve (GAAR) in 2009 and 2010 and Wrangell-St. Elias National Park and Preserve (WRST) in 2010 and 2011. These methods are being tested for estimating park-wide and regional abundance of Dall's sheep in six of Alaska's national park units. Results from the GAAR surveys, as well as details regarding the survey methods and hierarchical modeling used in data analysis are available in Schmidt et al. (2011).

The 2010 WRST survey was conducted from 20 to 30 July. Four pilot-observer teams flew 70 hours and completed 115 of 303 20-km transects that were generated across a 26,850 km² survey area matching that of the units surveyed by Strickland et al. (1992; Figure 4). Another 16 transects that were at high elevation in ice fields were eliminated as non-habitat. The plan was to finish all transects, but inclement weather (rain, low cloud cover and high wind speeds) hampered survey efforts in the southern half of WRST. Survey teams observed 223 groups totaling 976 sheep on transect. Of the observed sheep, 55.0% were ewe-like (ewes, yearlings, rams $\leq \frac{1}{4}$ curl), 14.6% were lambs, 29.9% were rams (with 5.6% full-curl or greater) and 0.5% were unclassified. Observed ratios of lambs/100 ewe-like and rams/100 ewe-like were 26.4 and 54.4, respectively.

A survey was conducted to finish transects in southern WRST from 25 July to 2 August 2011. Three pilot-observer teams flew 65 hours, completing 128 of the 172 remaining transects from the 2010 set; another three transects at high elevation in ice fields were eliminated as non-habitat. The teams flew on 27, 28 and 30 of July due to inclement weather during the rest of the planned survey period and forecasts for continued high winds beyond 2 August. Survey teams observed 82 groups totaling 429 sheep on transect. Of the observed sheep, 57.8% were ewe-like (ewes, yearlings, rams $\leq \frac{1}{4}$ curl), 19.3% were lambs, 22.8% were rams (with 5.1% full-curl or greater) and 0% were unclassified. Observed ratios of lambs/100 ewe-like and rams/100 ewe-like were 33.5 and 39.5, respectively.

Estimates of Dall's sheep abundance in northern and southern WRST will be generated from the 2010 and 2011 data, respectively. Adult and lamb estimates will also be generated, as well as

total, adult and lamb abundance for survey units 4E, 5E, 7E, 7W and 9 within GMU 12 (Figure 4).

For more information, please contact Joshua_Schmidt@nps.gov (907-455-0661) or Kumi_Rattenbury@nps.gov (907-455-0673).

REFERENCES

- Schmidt, J. H., K. L. Rattenbury, J. P. Lawler, and M. C. MacCluskie. 2011. Using distance sampling and hierarchical models to improve estimates of Dall's sheep abundance. *Journal of Wildlife Management*, in press.
- Strickland, D. L., L. L. McDonald, D. Taylor, K. Jenkins, and J. Kern. 1992. Estimation of Dall sheep numbers in the Wrangell-St. Elias National Park and Preserve. Biennial Symposium of the Northern Wild Sheep and Goat Council, Cody, WY, April-May 1992, 8:231-255. Available at <http://www.nwsgc.org/contents/1992contents.html> (accessed 1 February 2011).

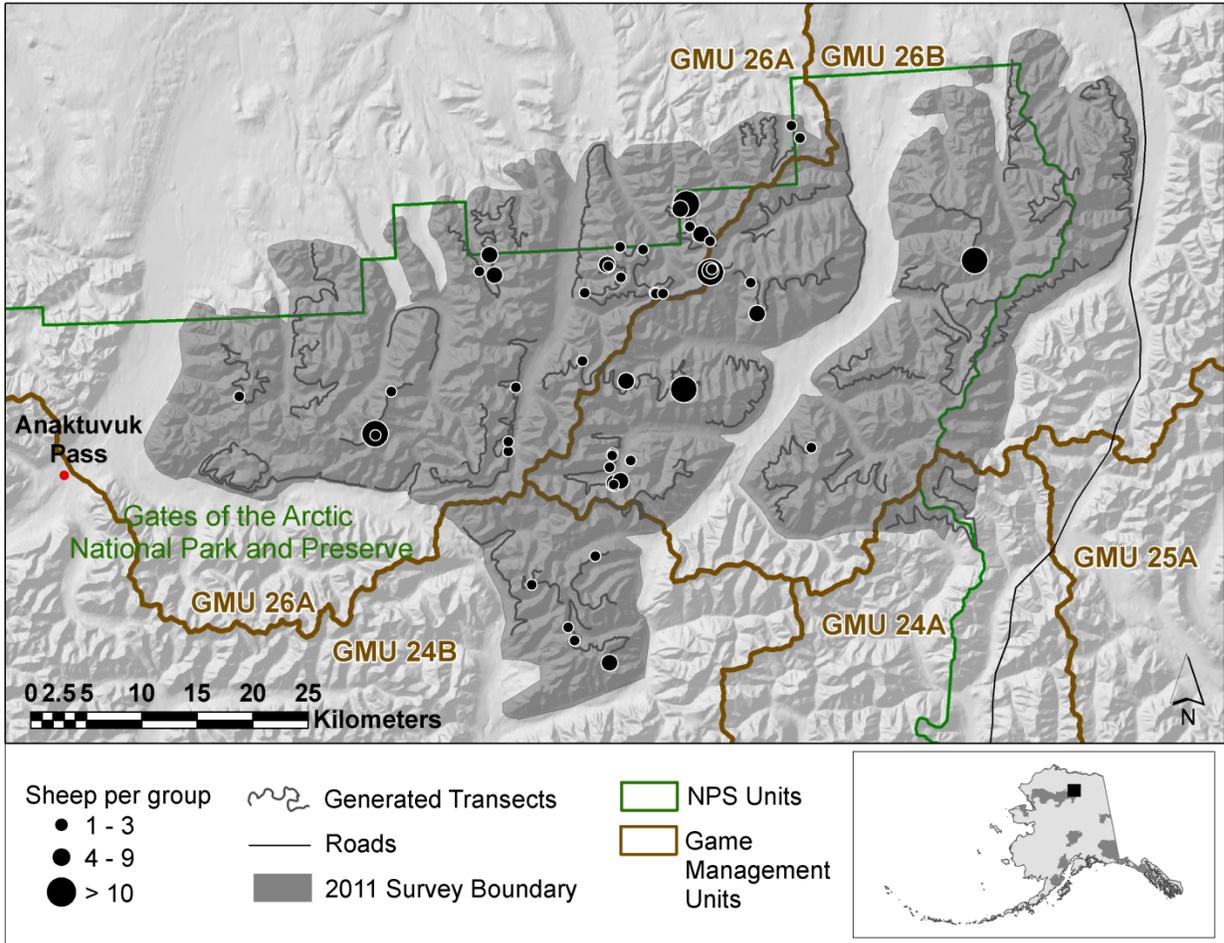


Figure 1. Locations of surveyed transects and detected groups of Dall's sheep during distance sampling surveys in the Itkillik Preserve, northeastern Gates of the Arctic National Park and Preserve, Alaska, USA, July 3-6, 2011.

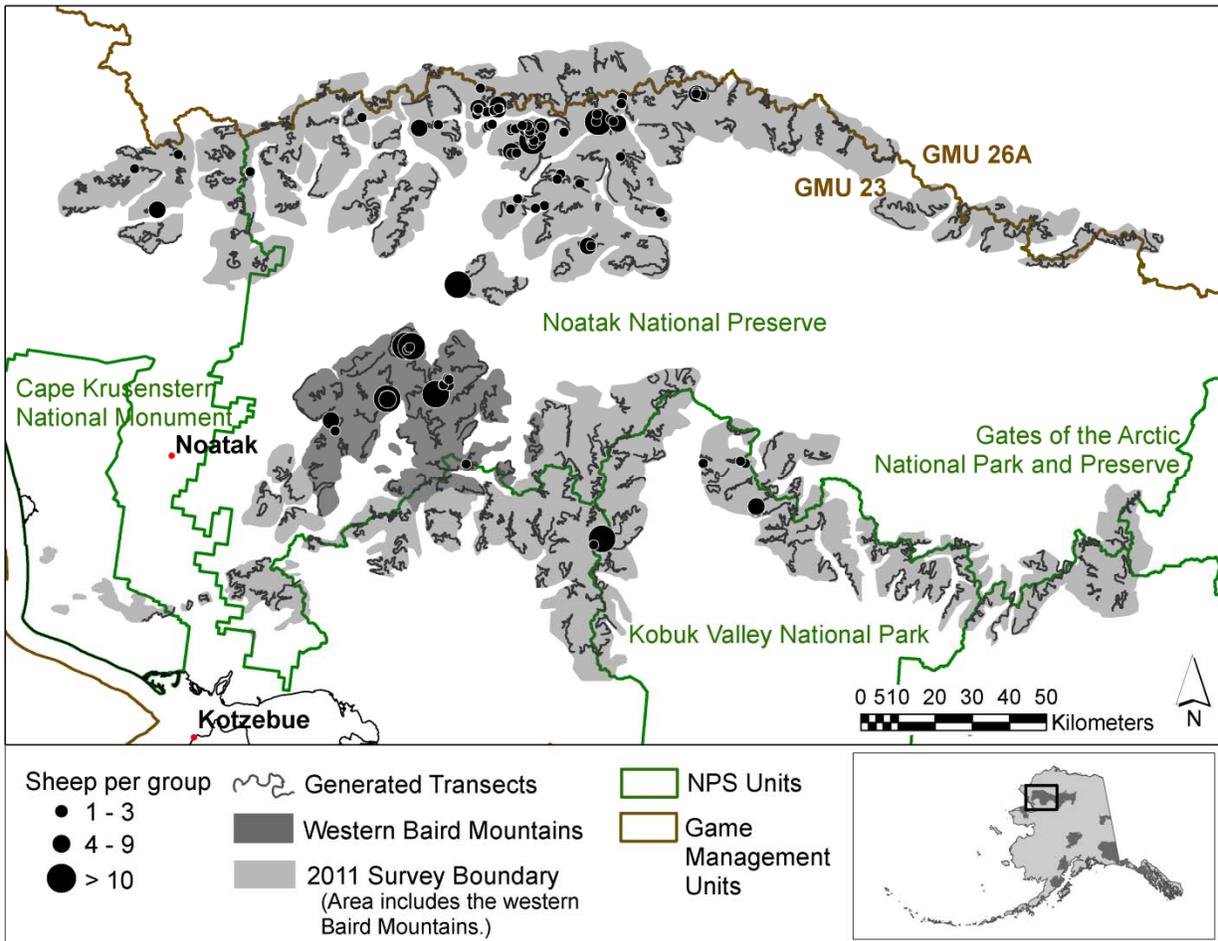


Figure 2. Locations of surveyed transects and detected groups of Dall's sheep during distance sampling surveys in the Western Arctic Parklands including Noatak National Preserve, Kobuk Valley National Park and Cape Krusenstern National Monument, Alaska, USA, 7-10 July 2011.

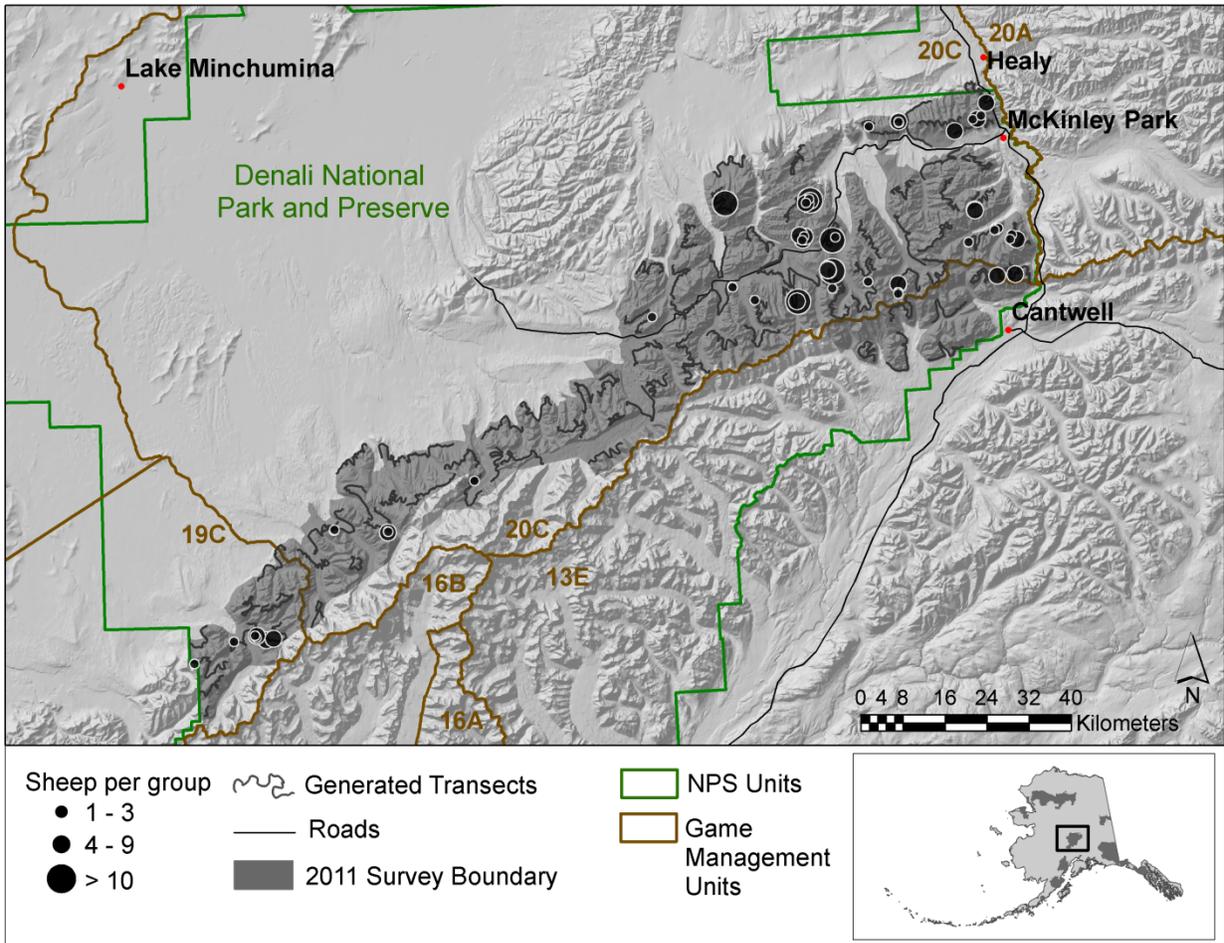


Figure 3. Locations of surveyed transects and detected groups of Dall's sheep during distance sampling surveys in Denali National Park and Preserve, Alaska, USA, July 20-21, 2011.

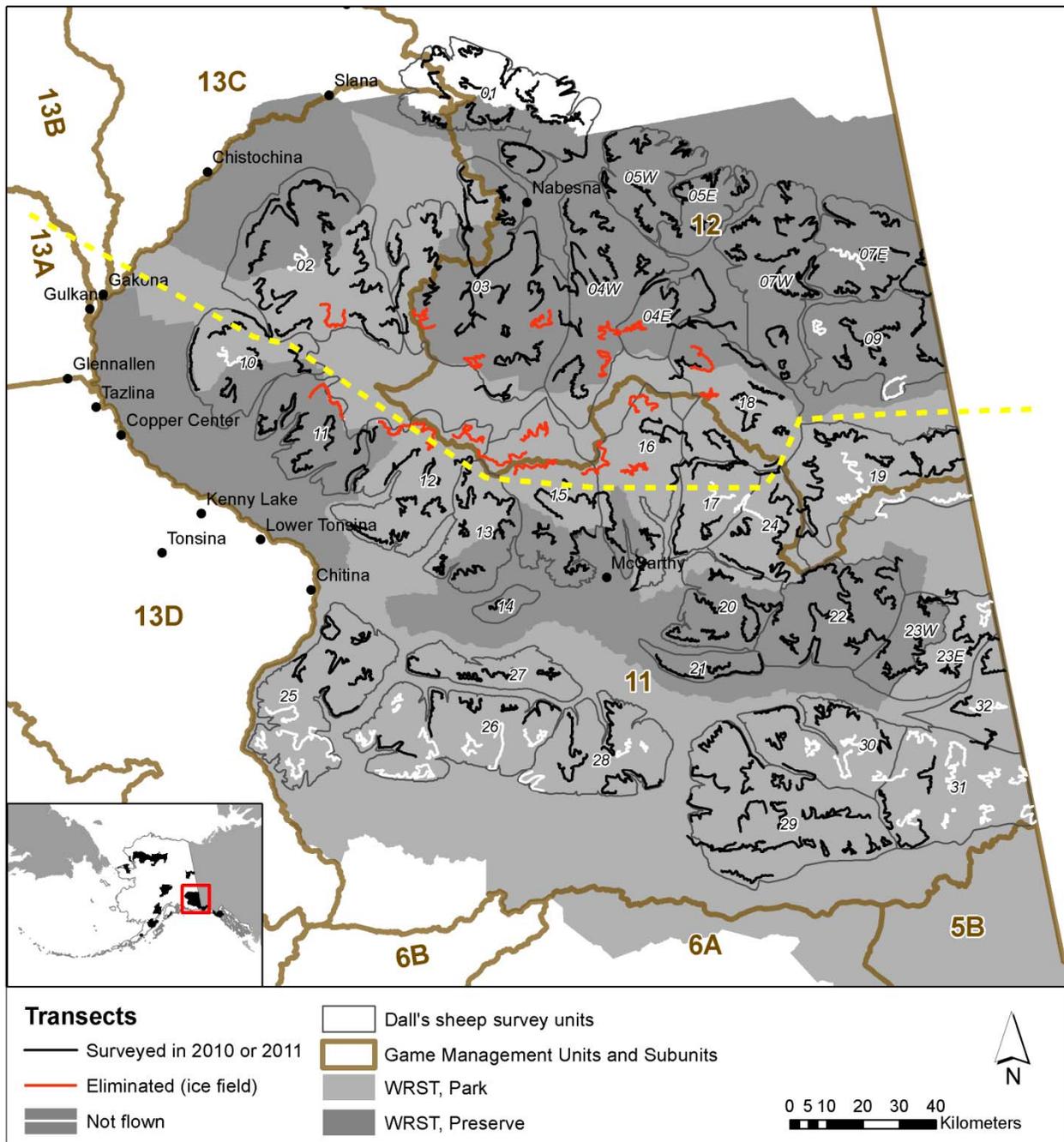


Figure 4. Distance sampling transects surveyed by the National Park Service to estimate Dall's sheep abundance in Wrangell-St. Elias National Park and Preserve (WRST), Alaska, USA, July 20-30, 2010 and July 27, 28 and 30, 2011. The dashed yellow line delineates those transects surveyed in 2010 (northern WRST) and those surveyed in 2011 (southern WRST).