

STUDY TITLE: Dispersal Patterns and Summer Ocean Distribution of Adult Dolly Varden from the Wulik River, Alaska, Evaluated Using Satellite Telemetry

REPORT TITLE: Technical Summary

CONTRACT NUMBER: M12AC00006

SPONSORING OCS REGION: Alaska

APPLICABLE PLANNING AREA(S): Chukchi Sea

FISCAL YEAR(S) OF PROJECT FUNDING: 2012-2014

COMPLETION DATE OF REPORT: August 2014

COSTS: \$272,250.00

PROJECT MANAGER(S): Kate Wedemeyer

LEAD AUTHOR OF REPORT: Andrew Seitz

AFFILIATION: University of Alaska Fairbanks

ADDRESS: PO Box 757220, Fairbanks, AK 99775-7220

PRINCIPAL INVESTIGATOR(S): Andrew Seitz, Brendan Scanlon

KEY WORDS: Dolly Varden, Salmonid, Pop-up Satellite Archival Transmitting tag, Chukchi Sea, Dispersal, Depth occupancy, Temperature occupancy

BACKGROUND:

In northwest Alaska near the Chukchi Sea, Dolly Varden charr *Salvelinus malma* is highly valued as a subsistence fish and local residents harvest thousands of these fish each year. While it is known that Dolly Varden may be widely distributed throughout the Pacific Ocean, it is not known whether this species occupies the offshore area of the Chukchi Sea. This area is an ecologically important feeding area for many marine mammals, fish, and seabirds, and may also be explored for oil and gas development. If Dolly Varden from northwestern Alaska occupies the offshore area of the Chukchi Sea, individual fish may potentially interact with oil and gas exploration and development activities. Given this, understanding the oceanic dispersal and behavior of Dolly Varden is important for several stakeholder groups to assess the potential interactions of this important fish species and emerging human activities in the Chukchi Sea.

OBJECTIVES:

1. Describe baseline ecological information about Dolly Varden tagged in the Wulik River, Alaska, including:
 - a. Timing of outmigration from the Wulik River to the Chukchi, Bering and/or Beaufort Seas
 - b. Summer dispersal
 - c. Temporal and spatial distribution
 - d. Depth and temperature occupancy
2. Describe temporal and spatial distribution in outer continental shelf areas to provide information to the public, biological resource managers and marine gas and oil resource managers to better understand potential interactions among Dolly Varden and exploration and development activities in the Chukchi, Bering and/or Beaufort Seas.

DESCRIPTION:

To understand the oceanic ecology of Dolly Varden in northwestern Alaska, we attached 52 Pop-up Satellite Archival Transmitting tags to Dolly Varden that overwintered in the Wulik River, AK. While externally attached to a fish, the tags measured and recorded temperature, pressure, and ambient light intensity data every two minutes. On pre-programmed dates, the tags released from the fish during the summer, floated to the surface of the ocean, and transmitted archived data to Argos satellites. Movement, habitat occupancy, behavior, geolocation, and mortality of Dolly Varden were qualitatively described by

examining end locations, dispersal distance, tag-recorded sea-surface temperature, time at liberty, depth occupancy, and temperature occupancy of tagged fish.

STUDY RESULTS:

Tagged Dolly Varden ranged from 62.0 to 91.5 cm (76.3 ± 7.1 cm, mean \pm SD), were at liberty for 2–127 days, had end locations in both marine and freshwater habitats, and dispersed a mean minimum distance of 210.1 ± 167.6 km (range 0–565 km). For tags with end locations in the ocean, eight reported from the Russian Chukchi Sea approximately 100–200 km north of the Chukotka Peninsula, exhibiting minimum travel distances of 319–470 km from their tagging locations. While at sea, they dispersed up to 60 km \cdot day⁻¹ and frequently occupied relatively shallow water. Specifically, while at sea, they spent 76.3% and 96.4% of the time in the top 5 and 15 meters of the water column. By comparing sea surface temperatures measured by the tags to those measured by satellites, our results suggest that fish remained in this relatively small area north of the Chukotka Peninsula for up to 45 days. Additionally, several fish dispersed through nearshore areas of northwestern Alaska, on their way to other rivers in the region. However, our results show no evidence that any tagged fish exhibited any northeasterly nearshore or offshore movements through U.S. OCS Federal Lease Areas, or movement to the Bering or Beaufort seas.

SIGNIFICANT CONCLUSIONS:

This study has produced new qualitative insights into the oceanic ecology of Dolly Varden in the Chukchi Sea. Specifically, it provides the first evidence that Dolly Varden execute relatively long offshore movements in the Chukchi Sea and feed on the outer continental shelf north of the Chukotka Peninsula of Russia. These fish are likely drawn to this area because of its relatively high biological productivity and is therefore likely an important summer feeding location for Dolly Varden. The remaining tagged Dolly Varden stayed in the Wulik River or dispersed through nearshore marine habitats of northwestern Alaska while moving to other rivers south of the Wulik River. However, this study did not provide any evidence of occupation or U.S. OCS Federal lease areas in the Chukchi Sea, therefore the lease areas are likely not important summer habitat of Dolly Varden from northwestern Alaska. Because the tagged Dolly Varden spent the majority of their time near the surface of the Chukchi Sea, and most human activities such as oil and gas exploration and development, and marine shipping are surface-based, this increases the likelihood of interactions among Dolly Varden and human activities.

STUDY PRODUCT(S):

Scientific presentations titled “Dispersal of adult Dolly Varden from the Wulik River, Alaska, evaluated using satellite telemetry” were given by Michael Courtney, Andy Seitz and Brendan Scanlon at the following venues:

1. Alaska Marine Science Symposium Anchorage AK, 22 January 2013
2. Alaska Chapter of the American Fisheries Society Annual Meeting, Fairbanks, AK, 9 Oct. 2013
3. Annual Meeting of the Arctic Division of the American Association for the Advancement of Science, Kodiak, AK, 26 Sep. 2013
4. Western Alaska Interdisciplinary Science Conference, Nome, Alaska, 22 Mar. 2013
5. Alaska Marine Science Symposium Anchorage AK, 21 January 2014