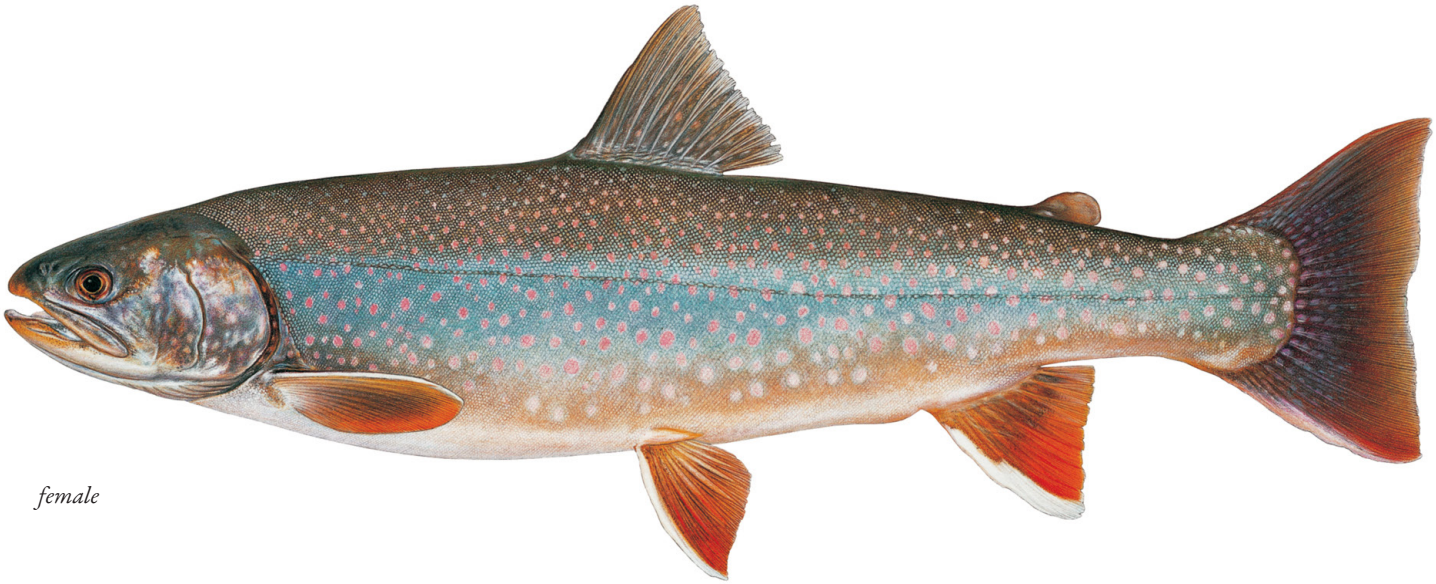
Dolly Varden Trout

(Salvelinus malma)



female

male

Data: Alaska Department of Fish & Game, Washington Department of Fish & Wildlife

Partners: Alaska Department of Fish & Game, Washington Department of Fish & Wildlife

Introduction

The Dolly Varden (*Salvelinus malma*) is native to cold-water tributaries of the Pacific Ocean in Asia and North America. It belongs to the genus *Salvelinus*, or true chars, which also includes the Brook, Lake and Bull Trout, as well as Arctic Char. Many populations are at least partially anadromous, but stream-resident and lacustrine (lake dwelling) populations occur throughout its range. Populations of Dolly Varden are generally thought to be stable throughout Alaska with some concerns about specific stocks, primarily around urban centers. Across most of their range, adults average 16-22 inches, but some populations in northern Alaska can produce fish over 36 inches and 20 pounds. (Figures 1 and 4).

Historical and Current Distribution

Dolly Varden are the most widely-distributed salmonid in Alaska. The range of Dolly Varden extends throughout the coastal areas of the state from Southeast Alaska across the Gulf of Alaska and the Bering Sea into the Chukchi and Beaufort seas to the Mackenzie River in northern Canada (Figure 2). Two forms or sub-species of Dolly Varden have been described in Alaska.

The northern form (*S. m. malma*) is distributed from the Mackenzie River to the north side of the Alaska Peninsula while the southern form (*S. m. lordi*) is distributed on the south side of the Alaska Peninsula to the southern tip

Figure 1. A trophy-size Dolly Varden trout (male). Photo credit Oliver Ancans

of Southeast Alaska, including Kodiak and the Aleutian Islands. Our understanding of the distribution of each form has changed in recent years with knowledge gained from genetic analysis. Both forms have anadromous and stream-resident forms; the lacustrine form is rare in the northern form but common in the southern form. The forms may differ greatly in the distance they travel during their marine migrations (Crane et al. 2004). The southern form typically stays in nearshore waters and migrates less than 60 km, while the northern form may migrate much further and have been documented migrating from northwest Alaska to Russian freshwaters to spawn or overwinter (DeCicco 1997). Populations in northern Alaska often feed hundreds of miles offshore in the open Arctic Ocean (Courtney et al. 2016).

Resident Dolly Varden populations also occur in headwater streams in the Tanana Uplands, Ray Mountains, Ogilve Mountains, Alaska Range, Wrangell-St. Elias Range, and Brooks Range. Elsewhere, their range stretches along the Pacific coast of North America from Washington to the Arctic coast of Canada, and along the Pacific coast of Asia from Russia south to Japan and Korea.

Dolly Varden in Washington occur primarily in the Olympic Peninsula and Puget Sound drainages. However, within that range they coexist with Bull Trout in most places and often express multiple life histories as well. The majority of available distribution data for Washington is for the group, not necessarily one species or the other. Thus available range maps show distribution for both species

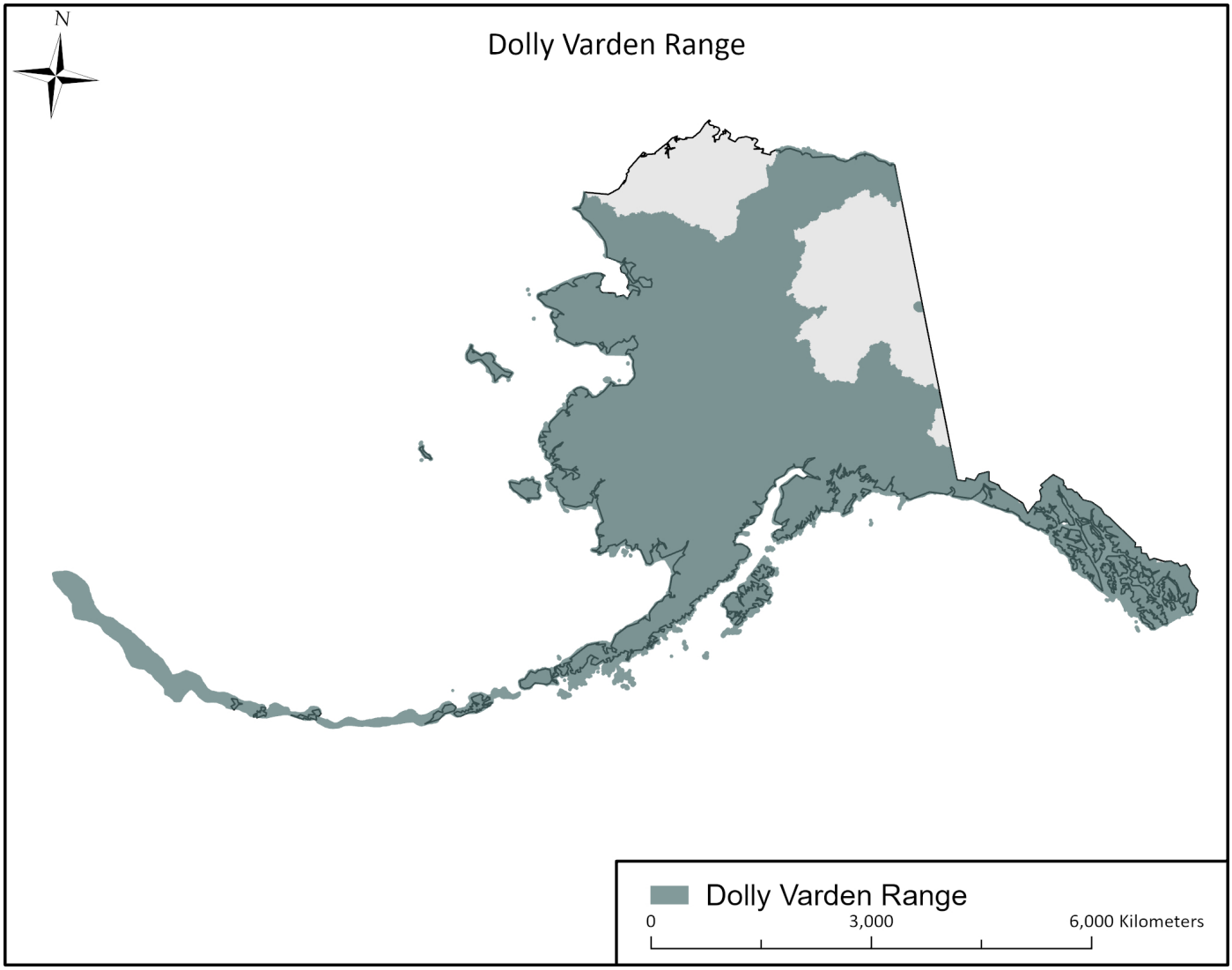


Figure 2. Dolly Varden range in Alaska

combined (Figure 3). Ongoing eDNA sampling and genetics studies should provide a better understanding of Dolly Varden-specific distribution in the future.

Habitat Requirements

Dolly Varden typically spend most of their time in cool, freshwater habitats but may also migrate into the various saltwater habitats. Freshwater habitat requirements of Dolly Varden range from headwater streams to large deep lakes and large rivers. Saltwater habitat ranges from estuaries and coastal shorelines to the open ocean.

Unimpeded migrations within and between freshwater habitats and passage to and from the ocean are essential to maintain the different life histories expressed by Dolly Varden populations.

Sportfishing

Dolly Varden are a popular sport and subsistence fish throughout much of their range. Annually, sport anglers in Alaska catch approximately 500,000 and harvest over 50,000 fish. They are often targeted by fishermen in lakes, rivers, and coastal areas while feeding on outmigrating juvenile salmon in the spring and early summer, and while they are feeding on the eggs and flesh of spawning salmon in the late summer and fall.

In Washington, Bull Trout and Dolly Varden are managed

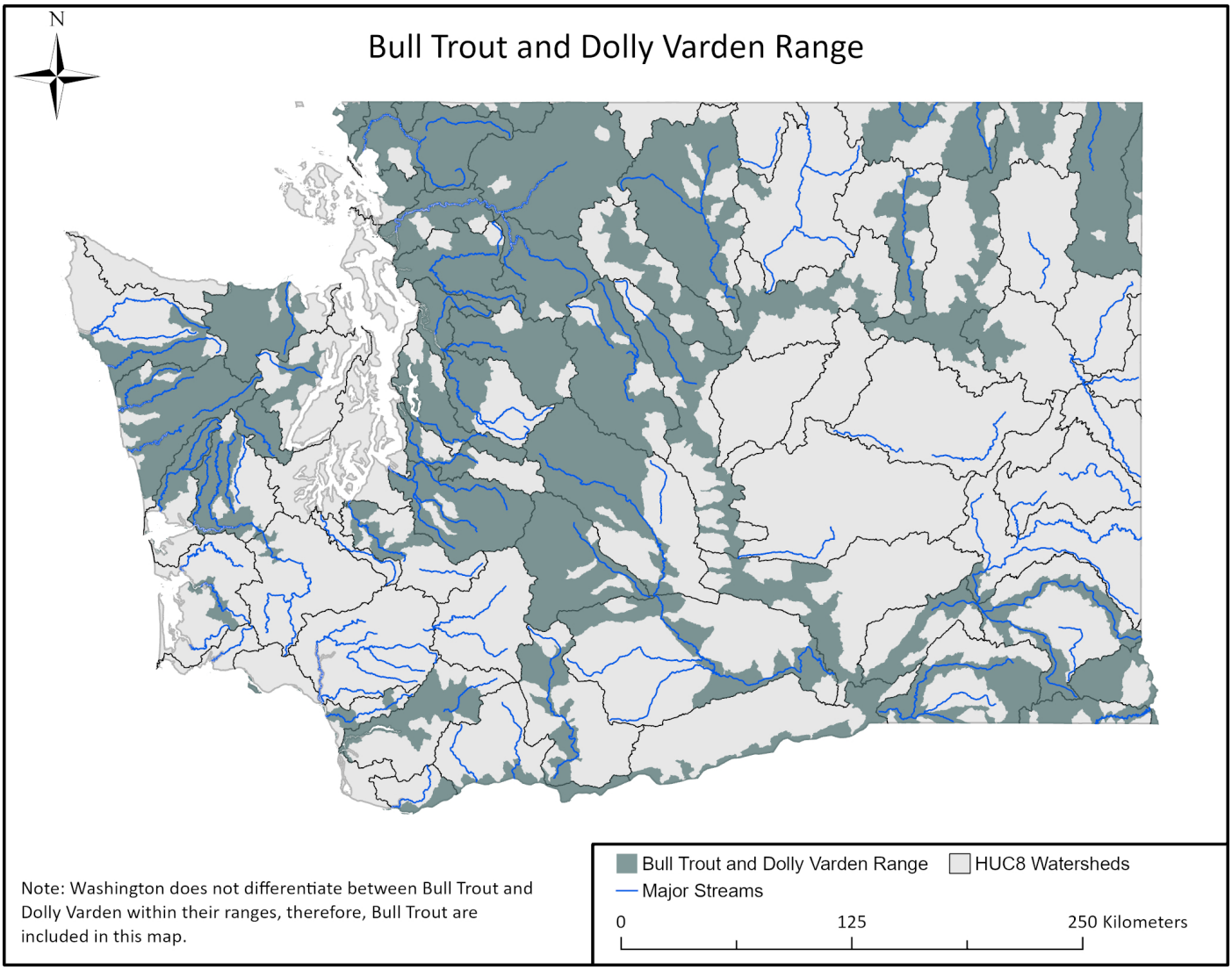


Figure 3. Dolly Varden and Bull Trout range in Washington

as a group as they coexist in many drainages in the Puget Sound area. Angling for these species is closed in all but two drainages in Washington, the Skagit and Snohomish rivers. Sportfishing for these species is specialized, with 5% of Washington's anglers having fished for and less than 1% of anglers preferring to target these species (Responsive Management 2023).

Threats

Genetic Considerations

While northern form Dolly Varden migrate home to their natal stream to spawn, tagging studies have shown that overwintering fish can be from multiple river systems (DeCicco 1997; Armstrong and Morrow 1980). This suggests that subsistence and sport harvests in a particular location may be comprised of populations from several different natal streams (Everett et al. 1997). Mixed-stock analysis using genetic data can provide an effective method for estimating the stock composition of Dolly Varden aggregations in overwintering areas and fishery harvests (Crane et al. 2005). A key management objective for effective management of subsistence fisheries is to estimate stock composition and relative contributions harvested.

Disease

There are no specific disease concerns that are not addressed in existing policies designed to prevent the introduction or spread of pathogens.

Habitat Concerns

Major habitat concerns are related to the development of hydroelectric dams and introduction of other salmonid species as part of salmon aquaculture programs. Localized populations of Dolly Varden are also vulnerable to urbanization and other land use activities such as mining, logging, gas development and road construction. Also, climate change may have profound effects on Dolly Varden, including changes in marine environment movement patterns resulting from alterations in ocean productivity and fish metabolism. Changes in water quality resulting from melting permafrost pose concerns in areas of the Brooks Range. Additionally, there may be shifts in the location and usage of overwintering areas resulting from alterations in stream discharge and freeze cycles (Crane et al. 2005; Glass et al. 2023).

Introduced Species

To date there are no concerns regarding interactions with introduced species. However, Dolly Varden apparently can hybridize with introduced Brook Trout possibly producing fertile offspring. Between 1917 and 1950, Brook Trout were stocked in many streams and lakes in Southeast Alaska. Since then, they have disappeared from all but about 20 lakes. Much of the Brook Trout stocking occurred in areas already occupied with native Dolly Varden. No genetic studies have been performed to evaluate the impact these Brook Trout may have had on Dolly Varden populations. Introduction of other salmonids through barrier removal or aquaculture practices could increase competition for resources.

In Washington, Brook Trout were historically stocked into some alpine lakes. Over time, some of these lake populations escaped into outlet streams and created localized, self-sustaining populations. Locations of these populations are currently being assessed with eDNA to prioritize Brook Trout removal.

Overutilization

There is currently little concern regarding overutilization of Dolly Varden in Alaska. In the past there have been concerns for localized stocks around larger communities. These concerns have led to the adoption of regulations reducing bag and possession limits. In Washington, angling for Dolly Varden is only allowed in two systems: the Skagit and Snohomish rivers. While both have a restricted bag limit, a high minimum size, and a shortened season, monitoring of angler catch and harvest in these areas should continue.

Oil and Gas Development

Natural resource development may present significant challenges for the health of many Dolly Varden populations. In Alaska, oil and gas exploration occurs on a large scale on the North Slope, and development of mineral extraction projects are beginning on the Alaska Peninsula. As resource development increases in Alaska, environmental monitoring and utilization of mechanisms to protect fish habitats will continue to be important to minimize impacts to Dolly Varden populations.

Conservation

Opportunities and Strategies for Improving Dolly Varden Status:

- Restoration of disturbed habitat following mining or other human activities.
- Removal of barriers to migration caused by human activities.
- Obtain reservations of water to protect and maintain existing populations of Dolly Varden.
- Genetic studies to identify and better define origins of mixed-stocks of Dolly Varden

Population Surveys, Genetic Analyses, and Fish Population Manipulation:

- Conduct stock assessments of Dolly Varden populations utilized by subsistence fisheries.
- Use mixed-stock analysis to obtain stock- specific information to further identify important overwintering aggregates.
- Maintain and enforce existing regulatory statutes (fishing regulations, water use, land management, etc.).
- Use eDNA to better understand distribution and follow up with stock assessment to better understand population demographics.
- Use stock assessment tools like spawner surveys, radio and satellite telemetry and mark/recapture experiments to better understand their movements and populations dynamics.
- Monitor effects of climate change on water quality in spawning and rearing areas.

Key actions:

- Continue management regulations to maintain current distribution.
- Characterize, conserve, and monitor genetic diversity of Dolly Varden.
- Develop methodology and implement standardized surveys and genetic analyses.
- Locate and assess genetically unique populations.
- Minimize potential effects of resource development.
- Conduct periodic stock status assessments on exploited populations.
- Attempt to understand the degree to which western Alaska Dolly Varden interact with Russian Far East Dolly Varden, and consequently their associated habitats and fishing pressures.

Habitat Manipulations

Key actions:

- Protect existing habitat to maintain distribution.
- Secure reservations of water to protect Dolly Varden habitat.
- Monitor potential climate change effects on habitat.

Figure 4. A very large Dolly Varden trout. Photo credit USFWS/John Wenberg

Regulatory and Administrative Actions

Harvest regulations and collecting reliable harvest data to maintain sustainable harvests will be an important component of maintaining the health of Dolly Varden populations. In addition, working with other entities to maintain appropriate regulations for prevention of disease, water quality impairment, and habitat disturbance are important considerations.

Key Actions:

- Maintain and protect Dolly Varden habitat from degradation by achieving compliance with existing habitat protection laws, policies, and guidelines.
- Enforce regulatory mechanisms that prevent negative impacts associated with subsistence users and recreational angling.
- Identify and protect unique genetic populations of Dolly Varden.

Recommended Actions to improve the status of Dolly Varden:

Conduct eDNA and fish surveys to identify and document distribution of Dolly Varden

Conduct genetic analysis to evaluate and identify unique stocks of Dolly Varden.

Maintain and enforce regulatory actions related to water and land use, as well as sport and subsistence fisheries.

Describe marine movements, feeding behavior, and use of Russian Far East freshwaters.

WNTI Completed or Ongoing Projects*

- Protect Coastal Cutthroat Habitat via Water Reservations in Southeast Alaska (2010) - $82,983
- Protecting Lacustrine Habitat for Coastal Cutthroat Trout through Reservation of Water in Southeast Alaska Phase II (2012) - $39,500
- Chester Creek (AK) stream bank stabilization and restoration (2013) - $6,000
- Restoring the Northern Extent of Coastal Cutthroat Trout Habitat in the Copper River Watershed (2023) - $46,750

** Both Dolly Varden and Kokanee habitat will be protected through water reservations and habitat restoration under these Coastal Cutthroat Trout projects.*

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