

Bull Trout and Dolly Varden Management Plan

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Executive Summary

The Bull Trout and Dolly Varden Management Plan describes the goal, objectives and strategies that will be used by the Washington Department of Fish and Wildlife (Department) for managing bull trout and Dolly Varden in Washington. The plan does not represent a consensus of all entities managing native char. However, the Department will work with Indian tribes and other management agencies to reach consensus through negotiations when implementing this plan at the local watershed level.

The goal of the Department is to restore and maintain the health and diversity of self-sustaining bull trout (*Salvelinus confluentus*) and Dolly Varden (*S. malma*) stocks and their habitats to levels that allow recreational utilization within resource protection guidelines. This goal addresses the Department's mandate, the Fish and Wildlife Commission's policies, and the Wild Salmonid Policy. The intent of the goal is to address stock health beyond numerical abundance by ensuring the long-term productive capacity of bull trout and Dolly Varden and their habitats.

In the state of Washington, bull trout and Dolly Varden, two closely-related native char species, co-exist. They have considerable biological similarities with respect to life history and habitat requirements. For these reasons the goal, objectives and strategies in this plan address both bull trout and Dolly Varden in Washington, and are referred to collectively as native char.

The Department completed a stock status report for bull trout and Dolly Varden in 1998 which identified 80 stocks statewide. Almost 18 percent were identified as healthy, 3% depressed, 8% critical and 72% as unknown.

This plan defines population maintenance, fisheries management and habitat maintenance objectives. In addition, it describes the enforcement, monitoring, evaluation and research efforts needed to meet the bull trout and Dolly Varden management goal and objectives.

Introduction

The Washington Fish and Wildlife Commission (Commission) is directed by the Washington State Legislature (RCW 77.04.055) to establish policies to preserve, protect and perpetuate fish and fish habitat and to maximize recreational fishing opportunities compatible with healthy and diverse fish populations. In 1995 the Commission established goals, policies and objectives for the Commission and the Washington Department of Fish and Wildlife (Department) to meet this mandate (Washington Fish and Wildlife Commission 1995).

In 1984 the Game Commission adopted a basic fishery management strategy (BFMS) for resident and anadromous trout in streams of the state of Washington (Washington Department of Game 1984) which in part focused management of bull trout and Dolly Varden (native char) in streams on sustainable wild production.

The Department completed a draft bull trout/Dolly Varden Management Plan in 1992 (Washington Department of Wildlife 1992) and initiated a programmatic Environmental Impact Statement (EIS) for the management plan under the State Environmental Policy Act. Based in part on comments received during review of the preliminary draft EIS, the Department elected to postpone completion of the bull trout/Dolly Varden management plan to ensure it was consistent with the policy for wild salmonids being developed.

In 1997 the Commission adopted the Wild Salmonid Policy (WSP) containing goals and policies concerning wild salmonids agreed to provisionally by Western Washington Treaty Tribes (Washington Fish and Wildlife Commission 1997a), and additional policy guidance for Department staff (Washington Fish and Wildlife Commission 1997b). These documents address issues including harvest by fisheries, hatcheries management, and habitat protection needed to manage salmonid resources in Washington.

In June of 1998 the U.S. Fish and Wildlife Service (USFWS) listed bull trout (*Salvelinus confluentus*) in the Columbia River Basin as threatened under the Endangered Species Act (ESA). The Puget Sound and Coastal populations were also listed as threatened in November of 1999. The Washington Department of Fish and Wildlife is now, and will continue to work cooperatively with the USFWS to develop recovery plans and implement recovery actions. The components of these plans are intended to be consistent with recovery of bull trout related to the ESA.

This management plan for bull trout and Dolly Varden in Washington State is consistent with the Commission goals, policies and objectives and provides specific guidance for management of these species by the Department under the WSP. It also provides guidance for and is consistent with ESA recovery planning efforts.

This plan does not represent a consensus of all entities managing native char. However, the Department will work with Indian tribes and other management agencies to reach consensus through negotiations when implementing this plan at the local watershed level.

Management Plan Goal

To restore/maintain the health and diversity of bull trout and Dolly Varden stocks and their habitats to/at self-sustaining levels that would allow recreational utilization within resource protection guidelines.

The intent of the goal is to address stock health beyond numerical abundance by ensuring the long-term productive capacity of bull trout and Dolly Varden and their habitats. The highest priority for management of native char will be resource protection. The specific objectives and strategies in this plan are grouped into several elements including population maintenance, fisheries management, and habitat maintenance. In addition, it describes the enforcement, monitoring, evaluation and research efforts needed to meet the bull trout and Dolly Varden management goal and objectives.

Taxonomy

Species of the genus *Salvelinus* are trout-like in appearance, but generally have finer scales and exhibit a reverse coloration with light spotting on a darker background, while the true trout and salmon have black spots on a lighter background. Bull trout and Dolly Varden are western North America's most southern derivatives of an evolutionary parent *Salvelinus*, possibly the Arctic char (Morton, 1970; Behnke, 1980; Savvaitova, 1980; Balon, 1984).

In the past, coastal native char were considered Dolly Varden and native char in inland waters were considered bull trout. Cavender (1978) demonstrated that bull trout and Dolly Varden were separate species and believed the geographic range of bull trout and Dolly Varden overlapped in the Puget Sound area of Washington and along the British Columbia coast. Researchers using morphometric techniques have found no clear separation of the two species in Washington and that bull trout or a morphologically intermediate, or hybrid form predominated, even in coastal waters (Johnson and Mongillo, 1991; Kraemer, 1991). However, Crane et al. (1994) and others (reviewed by Utter 1994) demonstrated that genetic data can differentiate the two species. Use of genetic methods has recently documented the presence of pure Dolly Varden in Washington, that pure bull trout are present both east and west of the Cascade crest, and that the two species occur sympatrically in two of Western Washington's water sheds, the Quinault River system (Leary and Allendorf 1997, Spruell and Allendorf 1997) and the Nooksack River system (Sewell Young, pers. comm., WDFW). Baxter et al. (1997) using molecular analysis confirmed the presence of natural hybrids and backcrosses between bull trout and Dolly Varden in the Thutade Lake drainage in north central British Columbia, and concluded that despite some apparent introgression, the two species appear to be maintaining distinct genomes.

Life History and Habitat Requirements

Bull trout and Dolly Varden exhibit four life histories: anadromous, adfluvial, fluvial, and resident (Leary et al., 1991). These four survival strategies are common in various forms of Arctic char's evolutionary derivatives and stocks worldwide. The four life history forms, or ecotypes, have unique life history and habitat requirement characteristics. However, there is a high degree of uncertainty regarding interrelationships, genetic and behavioral, among all four ecotypes.

Anadromous

Spawning and early rearing occurs in streams with major growth and maturation occurring in salt water. Stocks make frequent migrations into and out of lower mainstem rivers and estuaries. They often make long spawning migrations beginning early in summer. Mature adults normally range between 18 and 30 inches in total length.

Adfluvial

Spawning and early rearing occurs in streams, but most growth and maturation occurs in lakes or reservoirs. Adults enter mainstem rivers early in summer, often holding near their natal tributaries for months before migrating upstream. Most mature adults range in size between 20 and 32 inches.

Fluvial

Spawning and early rearing occurs in smaller tributaries with major growth and maturation occurring in mainstem rivers. They may move randomly throughout river systems, generally congregating near spawning tributaries in the summer. Mature adults are usually smaller than anadromous or adfluvial char, ranging from 16 to 26 inches long.

Resident

All life stages (spawning, rearing, growth, maturation) occurs in small headwater streams, often upstream of impassable barriers. Mature adults can vary from 8 to 15 inches, but they are seldom larger than 12 inches in total length. Resident native char have been observed to mix and interbreed with migratory forms unless physically separated by barriers.

Bull trout are believed to be glacial relicts whose distribution has expanded and contracted with natural climate changes (Reiman et al. 1997). They are strongly influenced by temperature and are seldom found in streams exceeding summer temperatures of 18°C. Cool water temperatures during early life

history results in higher egg survival rates, and faster growth rates in fry and possibly juveniles as well (Pratt 1992).

All life history stages of native char are associated with complex forms of cover, including large woody debris, under cut banks, boulders, and pools. Preferred spawning habitat consists of low gradient streams with loose, clean gravel and water temperatures of 5 to 9 °C in late summer and early fall. Depending on the life history form, rearing and overwintering habitat vary but still require cool clean water with insects, macro-zooplankton, and small fish for larger adults.

The native char of Washington evolved as an apex predator in most waters which they inhabit. Slow juvenile growth delays maturation until about age five, and reproduction may only occur on alternate years. Native char may live for 12 or more years in Washington, reaching sizes over 20 pounds where adequate forage is available. Stock densities of native char are generally much lower than other native game fish such as cutthroat trout (*Oncorhynchus clarki*) and rainbow trout (*O. mykiss*), or mountain whitefish (*Prosopium williamsoni*). The migratory forms of native char may travel long distances to reach spawning tributaries. Mature native char normally penetrate farther upstream than any other salmonids present in the watershed. Where native char and introduced brook trout (*Salvelinus fontinalis*) co-exist, hybridization may lead to eventual loss of native char stocks. A detailed discussion of the zoogeography and life history and habitat requirements of bull trout and Dolly Varden is presented in Brown (1992).

Distribution And Stock Status

Native char occur throughout Washington State but have been reduced from historical levels particularly in eastern Washington (Mongillo 1993). In addition to a reduction from historical numbers, several stocks in both eastern and western Washington have become fragmented where lower rivers are no longer utilized or free movement has been restricted. Relatively few native char are now observed in the mainstem Columbia and Snake Rivers. Native char have apparently been extirpated from the Chelan, lower Yakima, and Okanogan Basins. A number of stocks have been isolated above dams in river systems where they once roamed freely. However, with only a few exceptions, the overall geographic range of both continuous and disjunct stocks is believed similar to the historical range in Washington. Only one introduction of hatchery released native char has been verified in Washington. Anadromous Dolly Varden fry (14,500) from southeast Alaska were released into Lake Chelan in 1966. However, they were not observed in the lake after the initial introduction.

The Department completed a stock status inventory in 1998 for both bull trout and Dolly Varden using the methodologies developed by the Department and Western Washington Treaty Tribe's for salmon and steelhead (SASSI) (Washington Department of Fisheries et al., 1993). A separate inventory for each species was not performed due to the considerable biological similarities between the species and morphological methodologies to separate them where they coexist have not been widely applied. The stock status report identified 80 stocks statewide: nearly 18 percent were identified as healthy, 3% depressed, 8% critical and 72% as unknown (Table 1). For additional information on native char distribution and stock status refer to Washington Department of Fish and Wildlife (1998a).

| Table 1. Regional and statewide summary of bull trout/Dolly Varden stock status. | | | | |
|---|----------------|------------------|-----------------|----------------|
| | Healthy | Depressed | Critical | Unknown |
| Puget Sound | | | | |
| North Puget Sound | 2 | 0 | 0 | 7 |
| South Puget Sound | 0 | 0 | 0 | 6 |
| Hood Canal | 1 | 0 | 0 | 2 |
| Strait of Juan de Fuca | 1 | 0 | 0 | 3 |
| Totals | 4 | 0 | 0 | 18 |
| Coastal | | | | |
| North Coast | 1 | 0 | 0 | 5 |
| Grays Harbor | 0 | 0 | 0 | 1 |
| Totals | 1 | 0 | 0 | 6 |
| Columbia River | | | | |
| Lower Columbia | 0 | 1 | 0 | 0 |
| Upper Columbia | 9 | 1 | 6 | 34 |
| Totals | 9 | 2 | 6 | 34 |
| Washington State | | | | |
| 80 Total Stocks | 14 | 2 | 6 | 58 |
| Percent of Total | 18% | 3% | 8% | 72% |

Population Maintenance

The Department will use the stock (see glossary for definition) as the management unit for native char in Washington. Stock maintenance will be achieved through strategies defined in Washington Department of Game (1984), summarized by Wright (1992) and described below. Native char stocks will be managed to ensure long-term surplus production, and to provide recreational harvest opportunities and ecological benefits consistent with the Fisheries Management and Habitat Maintenance objectives of this plan. Population maintenance will be addressed using the following objectives:

Maintain and Restore Stock Distribution

The Department will manage native char stocks and their habitat to promote distribution throughout their historic range. Restoration efforts will be accomplished through the development of recovery plans that will address reasons for decline, historic distribution and solutions to restore depressed stocks to healthy levels.

Implementation Strategy:

- Habitat necessary for sustaining critical life history stages of native char including spawning and rearing will be protected or restored through efforts described in the habitat maintenance objectives.
- The Department will work through processes identified in the habitat maintenance objectives to protect current migratory corridors connecting remote headwater areas and restore historical migration corridors.

Reestablish Stocks in Historically Inhabited Areas

Stocks will be provided mechanisms (e.g. re-establishing migration corridors) that will promote natural recruitment of native char to formerly inhabited areas. In areas where the success of natural recruitment is improbable, supplementation may be employed to seed these areas. Supplementation will be limited to situations where: a) a stock is well below desired levels and it cannot rebuild itself due to some cause other than overfishing; b) a stock is being reintroduced to an area it formerly occupied; and c) the risks of potential stock loss through extinction are greater than the genetic risks due to gene flow or extinction risks due to the supplementation process itself.

Supplementation efforts must be rigorously planned to ensure consistency with available guidelines. This will include clearly stated objectives, assessment of genetic and ecological risks, and development of appropriate risk management and evaluation plans. All supplemental activities shall be reviewed and approved by regional and species managers prior to implementation.

Implementation Strategy:

- Where possible, natural recruitment of stocks will be promoted to seed native char historical areas.
- If reestablishing stocks via natural recruitment is not feasible, supplementation may be used to restore stocks. At a minimum, supplementation plans must identify:
 1. Assessment of the status of the target wild stock;
 2. Critical factors for decline;
 3. Goals of the project (desired future conditions, including recovery and habitat restorations plans);
 4. Natural reproduction objectives;
 5. Fishery management objectives;
 6. Risk assessments (genetic and ecological risks on targeted and non-targeted species and stocks);
 7. Availability of suitable donor stock;
 8. Methods, including operation protocol describing, rearing practices release strategies, and incubation;
 9. Monitoring and evaluation objectives and plans; and
 10. Expected duration.

Maintain and Restore Stock Abundance and Natural Biological Characteristics

All stocks will be managed to maintain recruitment levels that ensure stable or increasing population densities of all native char life history forms present, and a natural age structure through maturation.

Implementation Strategy:

- Where habitat is limiting, implement measures to restore habitat necessary for sustaining critical life history stages of native char including spawning and rearing.
- Manage recreational fisheries to ensure through minimum size limits, that one full age class of mature females is allowed to spawn at least once prior to being subject to harvest. This will be defined as the youngest age class with a majority (more than 50%) of mature females and may vary depending on life history forms and specific population characteristics.
- Sanctuaries and refugia will be used to protect some stocks from the effects of degraded habitat, harvest management strategies, and hatchery influences.

Conserve Genetic Diversity of Stocks

Genetic diversity will be maintained within and among stocks to allow local adaptation to occur with changing environmental conditions over the long term.

Implementation Strategy:

- Habitat will be protected so that the distribution and amount of habitat is sufficient to maintain genetic diversity and promote local adaptation. The Department will work through processes identified in the habitat maintenance objectives to protect migratory corridors that are essential to provide connectivity among populations.
- Where brook trout and native char currently overlap, the management emphasis will be to reduce or eliminate hybridization between them. This will generally be accomplished by using sport fishing regulations that allow higher harvest through increased daily limits, or with active suppression of brook trout through mechanical, electrical, biological, or chemical means.
- Brook trout will only be stocked in waters that are permanently isolated from native char to avoid any likelihood of interaction.

Fisheries Management

Consistent with the population maintenance objectives, fishery management efforts emphasize resource protection of native char stocks by restricting recreational fishing and harvest.

Fisheries will be managed consistent with the strategies described in *A Basic Fishery Management Strategy for Resident and Anadromous Trout in the Stream Habitats of the State of Washington* (BFMS) (Washington Department of Game 1984). Fisheries management will be based on the following principles:

Recreational Fisheries Will Only Be Allowed on Healthy Stocks with Surplus Production

Implementation Strategy:

- Directed sport fisheries on char will only be allowed on healthy stocks with harvestable surplus. Minimum size limits will be set based on life history type to ensure that a full age-class of females spawn at least once prior to recruitment into the fishery. This will be defined as the youngest age class with a majority (more than 50%) of mature females. Directed fisheries will not be allowed on stocks with depressed, critical or unknown status.
- Fishing closures for all species will be implemented in areas and times when there is a need to protect critical spawning and rearing native char and when abundance is so low that a stock can't tolerate incidental harvest.
- Selective gear restrictions (e.g. use of single barb-less hooks and bait restrictions) for all species will be implemented in areas and at times when there is a need to protect critical spawning and rearing char.

Habitat Maintenance

Many government agencies have jurisdiction for habitat protection and restoration in Washington State. The recently adopted WSP (Washington Fish and Wildlife Commission 1997a) identifies policies and performance measures for habitat maintenance that will be implemented by the Department for native char species. Habitat protection and restoration will occur primarily through a combination of locally-based watershed planning and the USFWS's bull trout recover planning process, to implement performance measures and strategies based on local conditions.

This section summarizes habitat maintenance objectives and implementation strategies for native char to meet the performance measure and action strategies described in the WSP.

Maintain and Restore Habitat Necessary for Sustaining Critical Life History Stages Including Spawning, Rearing and Migration

Implementation Strategy:

- The Department, consistent with its authority of the State Hydraulic Code will incorporate conditions into Hydraulic Project Approvals (HPAs) to protect native char from negative impacts associated with activities that are subject to regulation under the HPA laws.
- The Department will provide input into State Environmental Policy Act review documents, forest practice applications, the TFW process and the Forestry Module, growth management plans, mitigation agreements and water rights applications to protect native char habitat.
- The Department will actively participate on the Joint Cabinet for Natural Resources and will work with Tribes, local governments, and private interest groups to implement watershed plans that protect and restore native char.
- The Department will work within state laws and through the USFWS bull trout recovery planning process to implement management actions needed to provide functioning habitats for native char defined in the WSP habitat Policy Framework including: 1) habitat protection and management; 2) basin hydrology and stream flow (including suitable temperatures); 3) water sediment quality and sediment transport; 4) stream channel complexity; 5) riparian areas and wetlands; 6) lakes; and 7) marine areas.

Enforcement

Enforcement objectives and implementation strategies are intended to support the population maintenance, fishery management, and habitat maintenance objectives. The primary purpose of the Enforcement Program is to protect the fish and wildlife resources of Washington State. The enforcement of fishing regulations, seasons and stream closures and hydraulic code regulations, will effectively meet enforcement objectives for protecting native char stocks.

Enforce Seasons and Species-specific Fishing Regulations

Regulations governing fishing in areas where native char occur will be enforced to ensure angler compliance.

Implementation Strategy:

- The Fish Program will coordinate with the Enforcement Program to identify and prioritize waters for enforcement emphasis activities. Data on violations will be reviewed periodically to assess angler compliance with regulations.

Inform the Public Regarding Proper Identification of Native Char Species and Need for Their Protection

Implementation Strategy:

- Enforcement contacts with the public in the field will inform anglers of proper identification and conservation need for native char.
- Written and pictorial information will be distributed to the public to increase awareness of proper identification and conservation need for native char.

Enforce Hydraulic Project Approvals

Follow-up investigations of Hydraulic Project Approvals will be conducted to ensure permit compliance.

Implementation Strategy:

- Information related to native char waters (including spawn timing and locations) will be distributed to each habitat and TFW (Timber Fish and Wildlife) biologist responsible for processing HPAs or reviewing environmental documents to ensure appropriate conditions are incorporated into these documents to protect native char habitat.
- Compliance checks will be made to insure adherence to conditions of permitted activities.

Monitoring, Evaluation and Research

Native char stocks and habitats will be monitored to evaluate actions in meeting the management goal and objectives for native char. This management plan will be reviewed periodically, allowing for modifications of implementation strategies as identified through monitoring and evaluation. Investigative activities will be prioritized and implemented within Department budget. The following elements have been identified which will improve the department's ability to properly manage native char.

Monitor Fisheries

The Department will monitor fisheries to ensure that direct and incidental harvest do not adversely impact long-term productivity of native char stocks.

Implementation Strategy:

- Native char harvest will be monitored by Department Fish and Wildlife Officers during routine and emphasis patrols.
- The Department may conduct creel surveys to estimate the harvest of native char in directed fisheries and incidentally caught in other fisheries.
- The Department will determine the feasibility of expanding the current catch record card for recording harvest of native char species.
- Conduct angler surveys periodically to determine anglers' knowledge, opinions, and preferences regarding native char management.

Monitor Habitat Quality and Quantity

Inventory and assess native char habitat periodically to evaluate changes in habitat quality and quantity over time.

Implementation Strategy:

- Conduct an inventory and assessment of native char habitat to evaluate changes in basin hydrology and stream flows, water and sediment quality and sediment transport, stream channel complexity, riparian and wetlands, lakes and reservoirs, marine areas and fish passage and access.

Determine Distribution of Native Char Stocks

Standardized methodologies will be used to quantitatively determine the distribution of native char stocks in Washington. The USFWS provided funding for the American Fisheries Society (AFS) to develop a standard sampling protocol for bull trout, however those protocol are not available at this time. Until such time those protocol are available the department will use methodologies developed by Bonar et.al. (1997).

Implementation Strategy:

- Standard methodologies identified in Bonar et al. (1997) will be used to collect and analyze distribution data. Distribution data will be maintained in a Geographic Information System database.

Determine Stock Abundance and Biological Characteristics

The status (abundance and natural biological characteristics) of native char stocks will be assessed and the bull trout and Dolly Varden salmonid stock inventory will be updated biennially.

Implementation Strategy:

- Stock abundance information will be collected using methods presented in Bonar et al. (1997). Abundance data will be maintained in the Salmonid Stock Inventory database.
- Information on biological characteristics such as life histories, size, and age classes, of native char stocks will be collected and reported in annual reports and maintained in the electronic databases.
- Abundance and biological data will be evaluated biennially to update the status of native char stocks.

Determine Genetic Diversity of Native Char Stocks

Genetic analysis will be used to determine distribution of bull trout and Dolly Varden in Washington, identify stocks, identify their Major Ancestral Lineages and Genetic Diversity Units, and identify the genetic relationships among the different native char life history types.

Implementation Strategy:

- Native char stocks will be sampled for genetic analysis using non-lethal means (fin clips).
- Fin tissue samples will be analyzed by the Department using microsatellite DNA techniques.

Determine Length at Maturity and Frequency of Spawning for Individual Stocks

The published literature indicates native char stocks may spawn in alternate years. Current fishery management strategies set minimum size limits that allow harvest on individuals only after the majority of females have had an opportunity to spawn at least once (minimum size limit are set at the upper end of the length frequency distribution for the youngest age class containing a majority of first time spawning females).

Implementation Strategy:

- Determine reproductive frequency and length at maturity for stocks that currently have, or are expected to have, targeted harvest fisheries. Adjust minimum length criteria to ensure the age class containing the majority of females (as defined earlier) can spawn at least once prior to recruitment into the fishery.
- Unless stock specific information is available the minimum length criteria will be: 8-12 inches for resident fish, 20 inches for fluvial fish, 24 inches for adfluvial, and 20 inches for anadromous fish.

Determine Relationships Among Life History Types

It is probable that there is some level of genetic exchange among the four life history forms of native char. The extent of genetic exchange among resident, fluvial, adfluvial, and anadromous native char is largely unknown.

Implementation Strategy:

- Develop and implement research strategies to determine interactions between native char life history types.

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Glossary

Critical Stock: A stock of fish experiencing production levels that are so low that permanent damage to the stock is likely or has already occurred.

Depressed Stock: A stock of fish whose production is below expected levels based on available habitat and natural variations in survival levels, but above the level where permanent damage to the stock is likely.

Genetic Diversity Unit: A group of genetically similar stocks that is genetically distinct from other such groups. The stocks typically exhibit similar life histories and occupy ecologically, geographically, and geologically similar habitats. A GDU may consist of a single stock.

Hybridization: The genetic interbreeding of fish from two or more different stocks or species (e.g., brook trout interbreeding with bull trout).

Native Species: A species of fish indigenous to Washington State.

Stock: The fish spawning in a particular lake or stream(s) (or portion of it) at a particular season, which to a substantial degree, do not interbreed with any group spawning in a different place, or in the same place at a different season.

Healthy Stock: A stock of fish experiencing production levels consistent with its available habitat and within the natural variations in survival for the stock.

Unknown Stock: This description is applied to stocks where there is insufficient information to identify stock status with confidence.



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