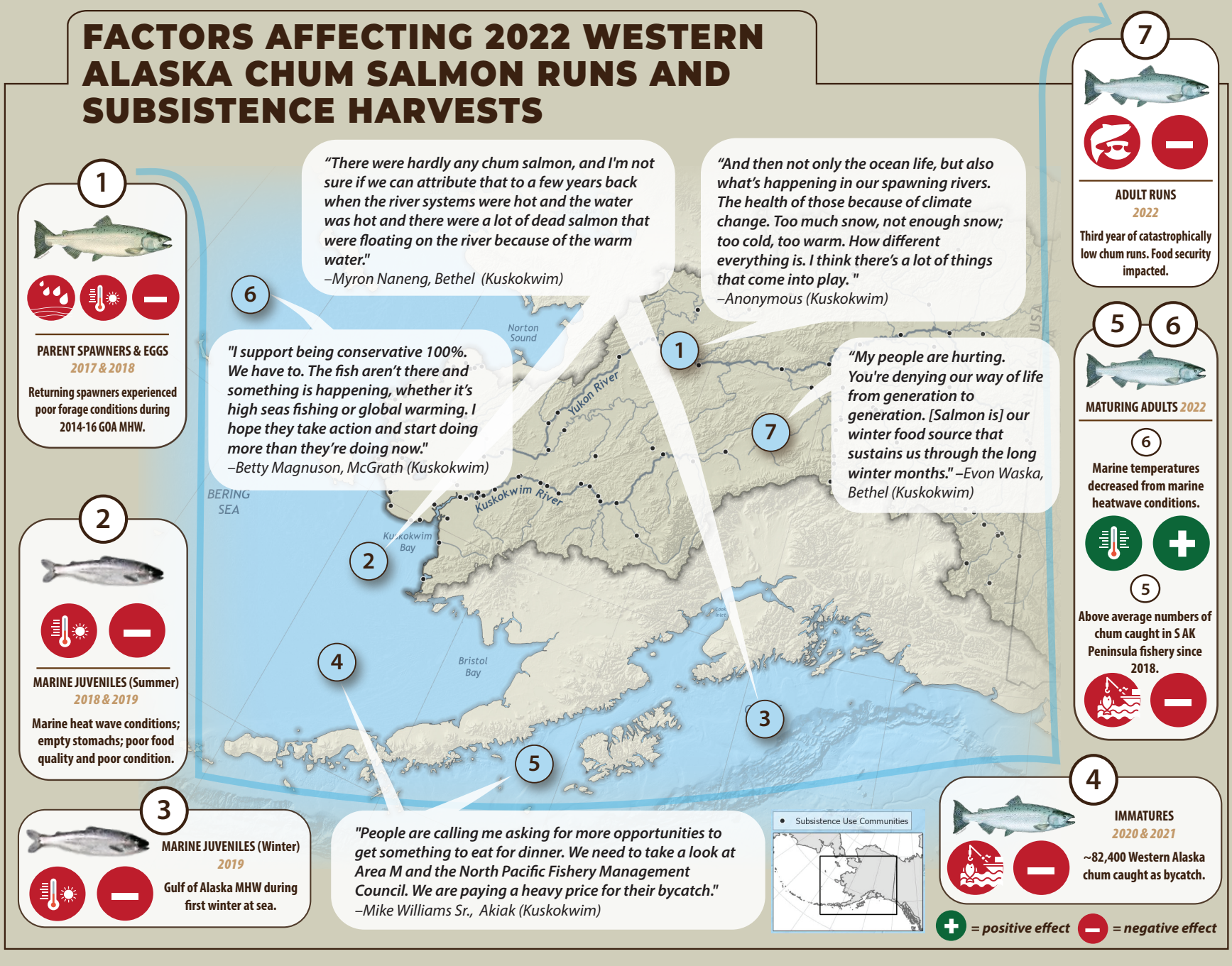
FACTORS AFFECTING 2022 WESTERN ALASKA CHUM SALMON RUNS AND SUBSISTENCE HARVESTS



Factors Affecting 2022 Western Alaska Chum Salmon Runs & Subsistence Harvests

Kevin Whitworth[1], Terese Schomogyi[1], Joseph Spaeder[2], Kathrine Howard[3],
Vanessa von Biela[4], Megan Williams[5], Patricia Chambers[5], and Elizabeth Siddon[6]

[1]Kuskokwim River Inter-Tribal Fish Commission, [2]Bering Sea Fishermen's Association, [3]Alaska Department of Fish & Game, [4]U.S. Geological Survey, Alaska Science Center, [5]Ocean Conservancy, [6]NOAA Fisheries, Alaska Fisheries Science Center

Western Alaska chum salmon runs are in a third year of a dramatic decline (KRITFC, 2022; Brenner et al., 2022). Salmon are integral to the Western Alaska ecosystem, bridging marine and freshwater habitats, filling both prey and predator niches, and supporting vital subsistence harvests (Courtney et al., 2019; KRITFC, 2022). The figure on page 1 highlights known factors that may have contributed to the extremely reduced 2022 run sizes of chum salmon across Western Alaska as evidenced by Western science, Indigenous Knowledge, and community observations from the Kuskokwim and Yukon rivers.

Cumulative ecosystem factors since 2014 have potentially impacted spawning adults, marine-stage juveniles and immatures, and ultimately returning adults in 2022. Parent spawners returning in 2017 and 2018 were exposed to warm ocean temperatures in the Gulf of Alaska (Ferriss and Zador, 2022) and Bering Sea (Siddon, 2022) and likely experienced associated increased metabolic rates (Barbeaux et al., 2020; Piatt et al., 2020; Murphy et al., 2021; Suryan et al., 2021). Western Alaska chum salmon return as either summer or fall run populations. Summer-run spawners can overlap with warm river temperatures, but it is not known if they experience heat stress impacts at comparable temperatures as co-occurring Chinook salmon (von Biela et al., 2020). Premature mortality of western Alaska chum salmon was observed during unusually warm river water temperatures in 2019 (von Biela et al., 2022) with the potential to influence 2023 and 2024 summer chum salmon returns. Fall-run chum salmon populations return later when river temperatures are cooler. Chum salmon have little to no freshwater rearing, outmigrate to sea shortly after hatching when they are still small (~30mm fork length) with residual yolk sac lipids as the only potential source of stored energy, and therefore are presumably among the most sensitive Pacific salmon species to early marine conditions (Burril et al., 2018).

Marine juvenile chum salmon experienced heatwave conditions during their first summer at sea in the Bering Sea in 2018 and 2019, and again during their first winter at sea in the Gulf of Alaska in 2018–2019. During these heatwave conditions, low zooplankton productivity (Siddon, 2022) contributed to decreased fish condition and empty stomachs; the 2019 stomach fullness index was the lowest on record for juvenile chum salmon in the northern Bering Sea (Murphy et al., 2021). Approximately 82,400 Western Alaska chum salmon (Coastal Western Alaska, Upper- and Mid-Yukon River stocks) were caught as bycatch in federal fisheries in the Bering Sea during the summer and fall of 2019 and 2020 combined[1]. Additionally, South Alaska Peninsula fisheries have caught above average numbers of maturing chum salmon since 2018; these are a mix of stocks, including Western Alaska stocks.

Marine temperatures largely relaxed to normal conditions over the past year (Siddon, 2022), which may have a positive effect on body condition and spawning success in 2022. However, due to the factors noted above, some of the lowest on-record chum salmon returns in 2022 led to heavily restricted subsistence fisheries for chum salmon in Kuskokwim and Yukon communities. Kuskokwim subsistence fishers were given few harvest opportunities for chum salmon, while Yukon subsistence fishers had no summer or fall chum salmon harvest opportunities. Neither Amounts Necessary for Subsistence nor escapement goals, critical for food security, cultural heritage, and rebuilding chum salmon populations, were met on these rivers in 2022 (KRITFC, 2022).

[1]https://meetings.npfmc.org/CommentReview/DownloadFile?p=247bfc4c-d7cd-4030-82ef-db503fbcb342.pdf&fileName=D1b%20BS%20Chum%20Salmon%20Bycatch%20Genetics%20Report%202021.pdf

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