Conventional tagging studies (e.g., Shimada and Kimura 1994) have found that Pacific cod migrate both within and between the EBS, AI, and GOA outside of their winter (January – April) spawning season. In 2021, a cooperative tagging study between the Alaska Fisheries Science Center (AFSC) and the Aleutians East Borough (AEB) was initiated to examine the seasonal movements of Pacific cod captured in the western GOA during the winter spawning season using pop-up satellite tags. Pop-up satellite tags are designed to release from the fish after a predetermined deployment time (e.g., 180 days) and transmit archived data to satellites after floating to the surface, whereas conventional tags require a platform of recovery such as a fishery. Pathways between release and pop-up locations can be reconstructed from archived depth, temperature, and light data recorded by the tags using a hidden Markov model. Satellite tags were released on Pacific cod in the western GOA in March 2021 and April 2022 to improve understanding of seasonal connectivity between winter spawning locations of Pacific cod in the western GOA and foraging locations in GOA and EBS during summer months when AFSC bottom- trawl surveys are conducted. In 2023 and 2024, the study was expanded to the central GOA to improve understanding of seasonal migration patterns for western and central GOA fish. During the expanded winter study, satellite tags were deployed at 10 release locations ranging from Sanak Island in the west to the entrance of Prince William Sound in the east. Winter release tags were programmed to popup after either 6 months (80% of tags) or 15 months (20% of tags). In 2023 and 2024, satellite tags were also released during the summer in the western and central GOA to better understand annual movement patterns and movement from summer foraging to winter spawning areas. Summer release tags were programmed to pop up after 12 months. To date, 194 satellite tags have been deployed in the GOA from 2021 to 2024 (Figure 2.2A). In the western GOA, 92 satellite tags were released on the winter cruise and 30 satellite tags were released during the summer. In the central GOA, 70 satellite tags were released on the winter cruise and 2 satellite tags were released during the summer. Pop-up locations for satellite tags deployed in the GOA to date (Figure 2.2B) indicate that seasonal connectivity exists between the western GOA (Shumagin Islands and westward), EBS, northern Bering Sea, western Bering Sea (Russia), and Chukchi Sea. Approximately 50% of cod tagged in the western GOA during the winter moved to summer foraging locations in the Bering Sea across all four years of tagging. However, fish tagged in the central GOA have not been observed to move into the EBS or AI. Within the central GOA, some tagged fish displayed considerable movement but largely remained within management areas. Partial migration (i.e., only part of the population undertakes seasonal migration) was evident in reconstructed pathways, as some fish remained in the vicinity of their release location year-round. Analyses to quantify and characterize movement between management areas within the GOA and between the GOA and the Bering Sea are on-going. Additional satellite and conventional tag releases in the GOA are planned for March 2025.

A map of the united states

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Figure 2.2 Pacific cod satellite tag A) release locations in Gulf of Alaska (GOA) management areas 610, 620, and 630 from 2021 – 2024 and B) pop-up locations from GOA satellite tag releases by region (AI = Aleutian Islands, EBS = Eastern Bering Sea, NBS = Northern Bering Sea, CS = Chukchi Sea).