State of California
Department of Fish and Wildlife

Memorandum

Date: November 16, 2022

To: Erin Chappell
Regional Manager
Bay Delta Region
Department of Fish and Wildlife

From: Dr. Timothy D. Malinich
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Subject: 2022 Summer Townet Survey Age-0 Striped Bass Abundance Index

The 2022 Summer Townet Survey (STN) age-0 Striped Bass abundance index could not be calculated. This has occurred previously in the history of the Summer Townet age-0 Striped Bass index (i.e. 1966, 1983, 1995, 2002; see Figure 1).

STN annually conducts six Delta-wide surveys; in 2022 they occurred on alternating weeks beginning on June 6th and ending August 19th. Each survey sampled 31 stations that contribute to the index, as well as nine supplemental stations in the Napa River, Sacramento Deep Water Ship Channel (SDWSC) and Cache Slough (Figure 2). Each year the annual abundance index is calculated using catch data from the two surveys bracketing the date when the mean fork length of age-0 Striped Bass (*Morone saxatilis*) reaches or surpasses 38.1 mm. The abundance of age-0 Striped Bass beyond this size has been found to be an indicator of survivorship to mid-summer (Stevens 1977, 1979, Turner and Chadwick 1972).

The mean 38.1 mm fork length in 2022 was exceeded at index stations by survey 4 (July 18-20; see Figure 3 and Table 1). No Striped Bass were collected in survey 3 at index stations. Since the STN age-0 Striped Bass index is reliant on fork lengths and catch values from two surveys bracketing the target fork length, we could not calculate the annual index for 2022. This is the first occurrence of STN observing zero Striped Bass catch among stations in a survey intended for index calculation. The individual survey indices and associated mean fork lengths are listed in Table 1.

Table 1. Survey dates, catch, indices and associated mean fork lengths of age-0 Striped Bass at STN index stations. Dates and associated values apply only to the sampling of the original 31 index stations.

Survey and Date	*Catch*	*Survey Index*	*Mean Fork Length (mm)*
Survey 1 (6/6/22-6/8/22)	17	0.307	16.9
Survey 2 (6/20/22-6/22/2022)	49	1.64	17.6
Survey 3 (7/5/2022-	0	0	

7/7/2022)			
Survey 4 (7/18/2022-7/20/2022)	9	0.385	53.7
Survey 5 (8/1/2022-8/4/2022)	1	0.053	77
Survey 6 (8/15/2022-8/19/2022)	2	0.075	93.5

Beyond reporting for index stations, the STN observed a Striped Bass distribution that was skewed toward the northern Delta stations, particularly the SDWSC. Survey 1 (6/6-6/9) caught a total of 162 Striped Bass and size distributions were fairly similar between index and non-index stations (Figure 3). In survey 2 (6/20-6/23), the Striped Bass catch had decreased to 92, but again the fork lengths of measured bass were similar between index and non-index stations despite the majority of bass residing in the SDWSC. In survey 3 (July 5-7) Striped Bass (n=59) were only observed at 4 non-index stations (719, 795, 796 and 797). For comparison the 20-MM survey, which shares many of the same stations except the most northern 3 SDWSC stations and sampled the week prior (6/27-6/30) to STN survey 3 and observed only 49 Striped Bass in the North Delta and Lower Sacramento River. Catches of Striped Bass in STN Survey 4 (7/18-7/21) declined across the Delta (n_{total}=14) but increased mildly within the range of index stations (n_{index}=9). Finally, survey 5 (8/1-8/5) collected a total of 3 and survey 6 (8/15-8/18) collected 4 age-0 Striped Bass.

The STN age-0 Striped Bass index can highlight long-term trends in the Striped Bass population. Since the inception of the Summer Townet Survey, the age-0 Striped Bass index has declined. The number of Striped Bass observed by STN in the delta can vary due to biotic influences such as the timing of spawning, as well as abiotic influences such as freshwater flow. Changes in flows and the position of X2 are known to impact the STN indices (Stevens 1979; Kimmerer et al. 2001) and occasionally make it impossible to calculate the index. Specifically high flows in the years 1983 and 1995 were believed to either push young-of-year Striped Bass out of the STN sampling range or extended the period of growth further than the temporal coverage of STN*. This is not the same situation in 2022, where young striped bass experienced the third consecutive year of drought. Striped Bass are negatively influenced by drought conditions (e.g. low freshwater flow and high water temperatures) and have been described as having low drought resistance (Mahardja et al 2021). The same research observed that Striped Bass can recover quickly during wet years, but lower populations may be expected or even permanent with increasing drought severity and shorter periods of wet year conditions. Additional information on prior year indices, methods, and catch data can be found on our webpage: https://wildlife.ca.gov/Conservation/Delta/Townet-Survey.

* Two other “No Index” years occurred in STN history. In 1966 no vessel was available for sampling and in 2002 a vessel breakdown prevented researchers from completing the 5th and 6th STN survey.

References

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Turner, J. L. and H. K. Chadwick. 1972. Distribution and abundance of young-of-the-year striped bass, *Morone saxatilis*, in relation to river flow in the Sacramento-San Joaquin Estuary. Transactions of the American Fisheries Society 101(3):442-452.

Attachments: (Figures 1-3)

Cc: Dr. Jim Hobbs
Steven Slater
Kathy Hieb
Lauren Damon

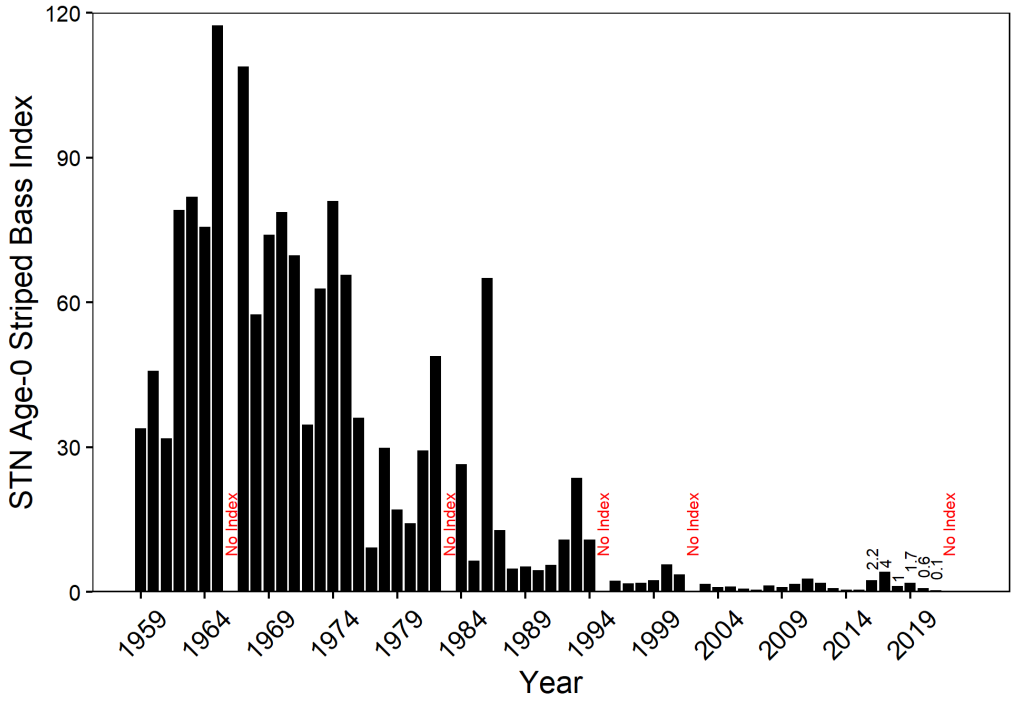

Figure 1. Summer Townet Survey age-0 Striped Bass abundance indices, 1959-2022.

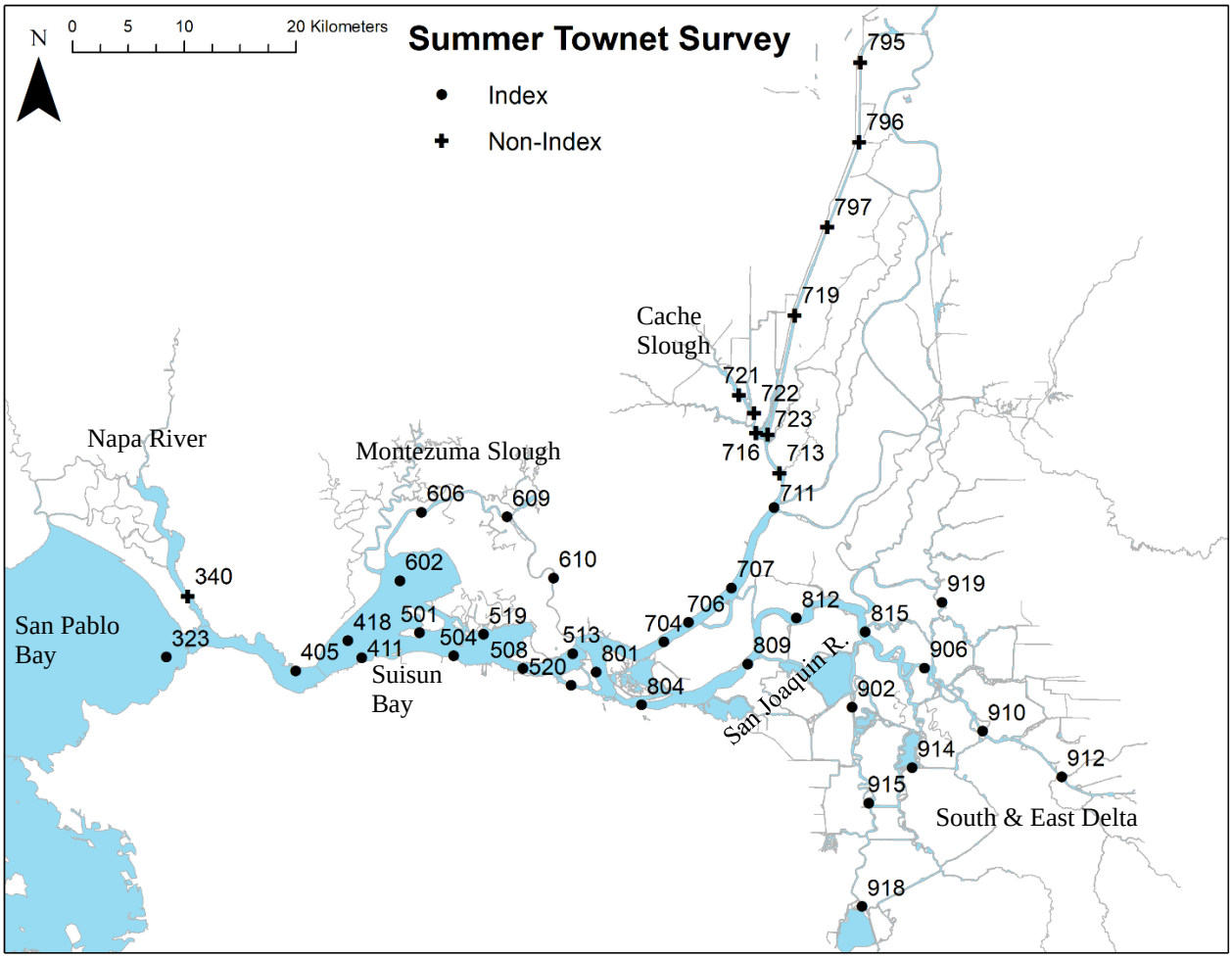

Figure 2. Map of Summer Townet Survey index stations (circles) and non-index stations (crosses) within the San Francisco Delta Estuary. Note that the non-index station 722 was added in 2021 to replace the previously sampled non-index station 721. Station 721 could not be sampled due to excessive aquatic vegetation.

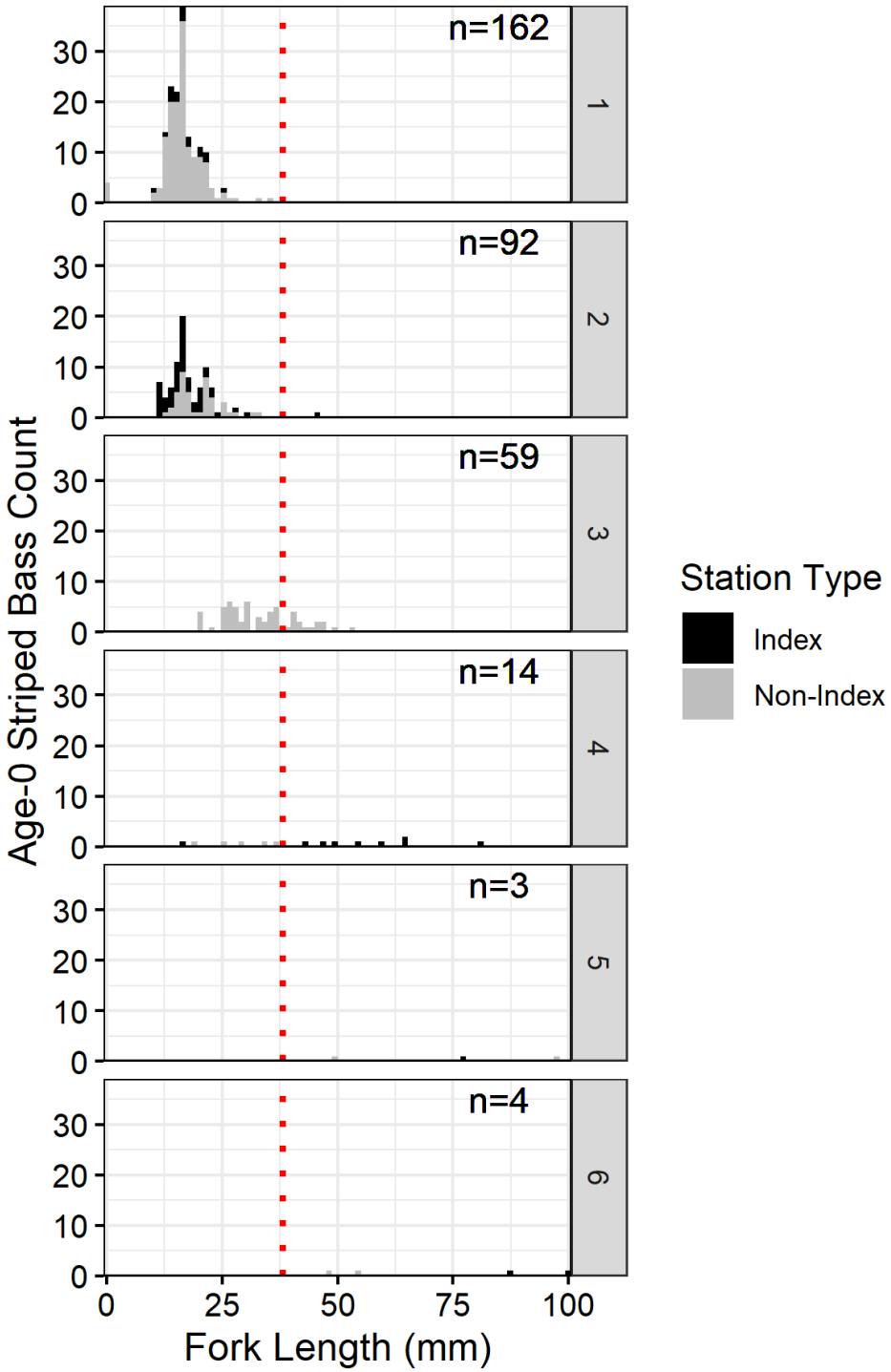

Figure 3. Length frequency histograms for age-0 Striped Bass caught in index (black) and non-index stations (grey) during surveys 1-6 (right axis). The red dotted line indicates the target 38.1 mm mean fork length used to calculate the age-0 Striped Bass index, n is the total (index and non-index) number of bass caught during each survey.