Table 1. Summary of catch data, estimated escapement, estimated run size, and exploitation rate for Alewife on the Gaspereau River, NS.

Year	Catch estimate	Escapement estimate	Estimated run size	Exploitation rate (%)
2023	1,431,500	1,312,700+/-52,246	2,744,200	52.2
2022	1,562,900	874,862+/-36,935	2,437,762	64.1
2021	1,231,005	984,094+/-36,504	2,215,099	55.6
2020	1,202,604	NA	NA	NA
2019	784,152	1,021,186+/-41,881	1,805,338	43.4
2018	903,655	1,061,688+/-43,546	1,965,343	46.0
2017*	605,900	1,114,450+/-40,127	1,720,350	35.2
2016*	769,133	454,800+/-25,221	1,223,933	62.8
2015*	705,500	438,874+/-24,070	1,144,374	61.7
2014	439,000	NA	NA	NA
2013	387,333	149,682	537,015	72.1
2012	394,803	158,387+/-31,677	553,190	71.4
2006	282,589	242,078+/-36,312	524,667	53.9
2005	219,173	299,910+/-59,982	519,083	42.2
2004	268,820	222,662+/-22,266	491,442	54.7
2003	416,335	435,832	852,167	48.9
2002	391,278	310,746	702,024	55.7
2001	119,348	238,842	358,190	33.3
2000	754,585	98,883	852,468	88.4
1999	698,600	81,236	779,926	89.6
1998	372,400	171,639	544,039	68.5
1997	611,520	95,443	706,953	86.5
1995	954,960	126,933	>1,081,892	<88.3
1984	212,966	111,100	324,066	65.7
1983	150,408	114,800	265,208	56.7
1982	254,068	50,400	304,468	83.4
1970	480,000	60,527	540,527	88.8

Notes: Data from 1970 through 2006 are from McIntyre et al. (2007). Other data are unpublished. Escapement estimates from 2003 to 2019 obtained by sub-sampling video. In 2013, the escapement estimate is number of fish estimated between 0600h and 2000h adjusted by the proportion of fish that moved between 0000h and 0600h and between 2000h and 2400h from 2015-2019. Total counts were used in other years. The catch estimates for 2012 to 2022 were provided by the buyer initially as the number of pounds purchased. These are converted to the number of fish by dividing the number of pounds purchased by the weight per pail (30 lbs), and multiplying by the estimated number of fish per pail (83 fish/pail). The 2012 to 2017 values are not adjusted for landings that were sold as bait or for local consumption. The 2018, 2019, and 2021 catch estimates are adjusted for fish sold as bait. The count in 1995 is a partial count but is considered mostly complete. Values may change as further information about the fishery is obtained. No escapement estimates were calculated in 2020 due to the COVID-19 pandemic.
NA = not available
* Minor adjustments (<0.2%) were made to escapement estimate since the 2017 version.

Table 2. Biological reference points for the Gaspereau River Alewife stock consistent with DFO's precautionary framework (from Gibson et al. 2017). Assessment results can be compared against these reference points to determine stock status.

Reference point	Acronym	Description	Value
Upper Stock Reference Point	USR	Spawning stock biomass or number of spawners above which stock is healthy; if below but still above the LRP, the stock is in the cautious zone. Can be SSBMSY or similar value	400,000 fish
Lower Stock Reference Point	LRP	Spawning stock biomass or numbers of spawners below which the stock is in the critical zone	235,000 fish
Exploitation Rate Removal Reference Level	URR	Exploitation rate above which the stock is over exploited	0.53
Exploitation Rate Lower Removal Reference Level	ULRR	Exploitation rate above which stock is fully exploited, below which stock is under exploited	0.35

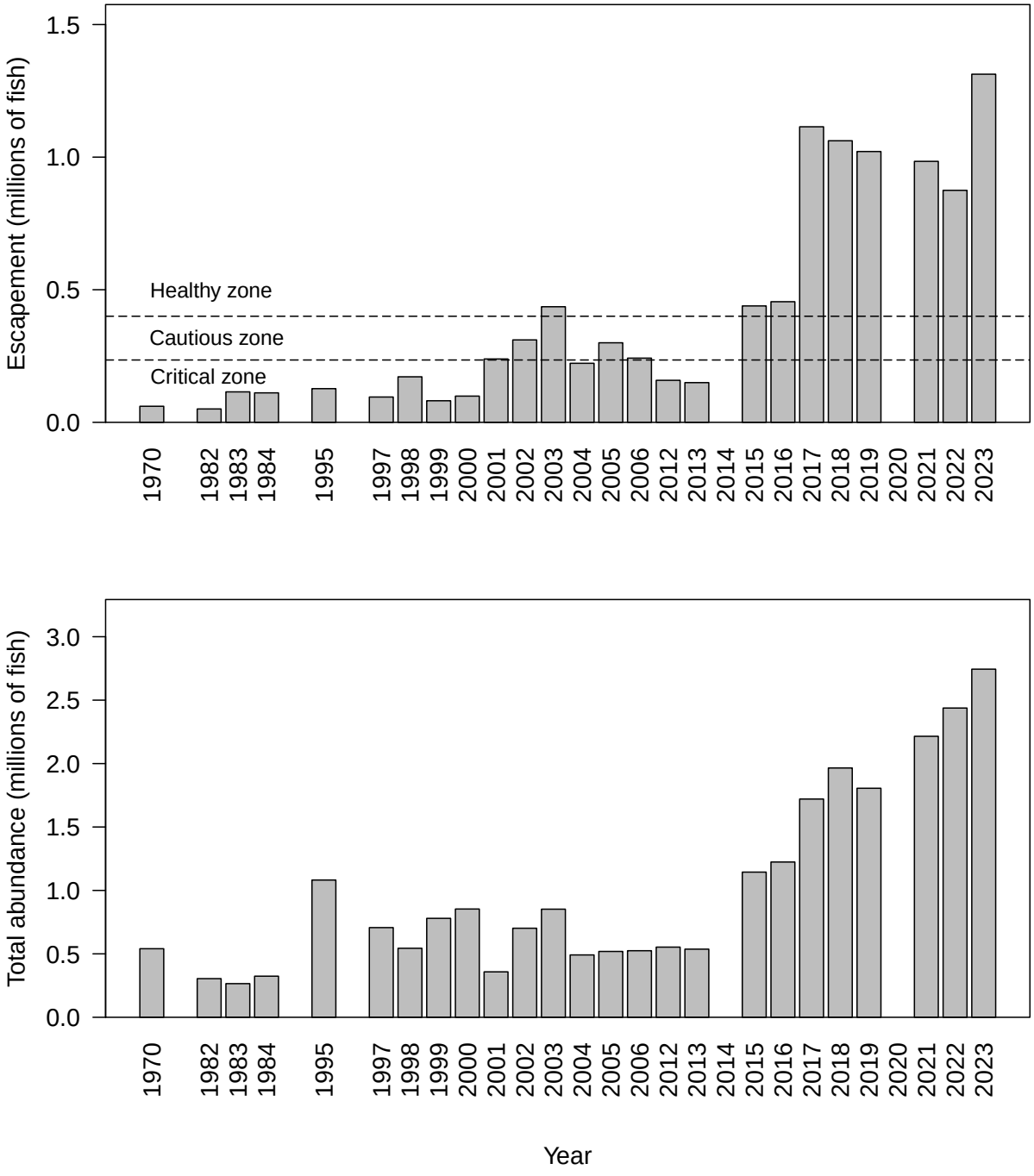

Figure 1. Spawning escapement (the number of fish ascending the White Rock fish ladder) and total abundance (the catch + escapement) for Alewife in the Gaspereau River for years in which estimates of the total escapement are available. Values are provided in Table 1.

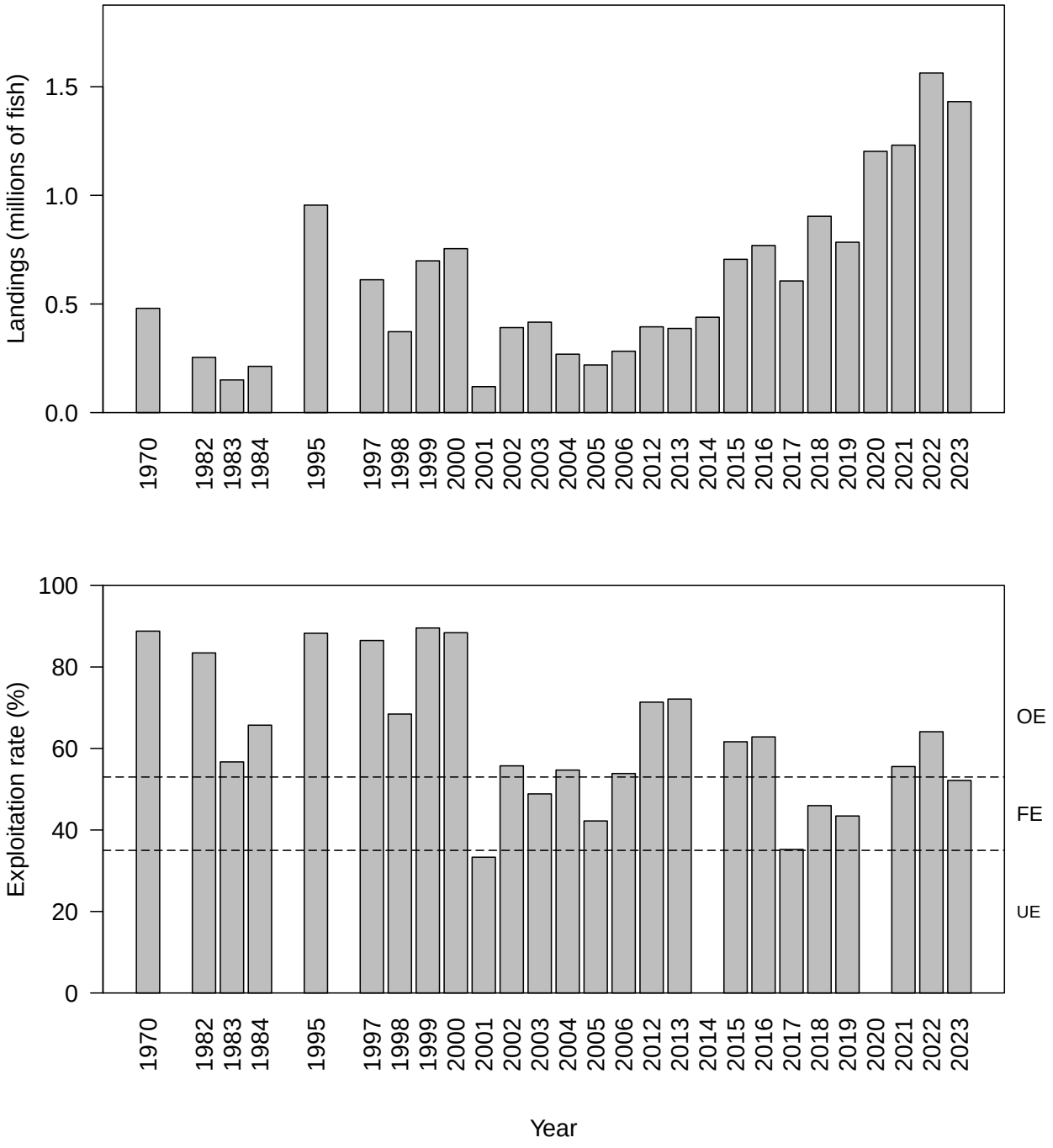

Figure 2. Landings in the commercial fishery and exploitation rates for Gaspereau River Alewife fishery for years in which estimates of the total escapement are available. Landings for 2012 and 2014 are also included, although counts are not available for those years. Values are provided in Table 1. Exploitation rates that fall within the areas labeled "OE", "FE" and "UE" refer to over exploited, fully exploited and under exploited, respectively.

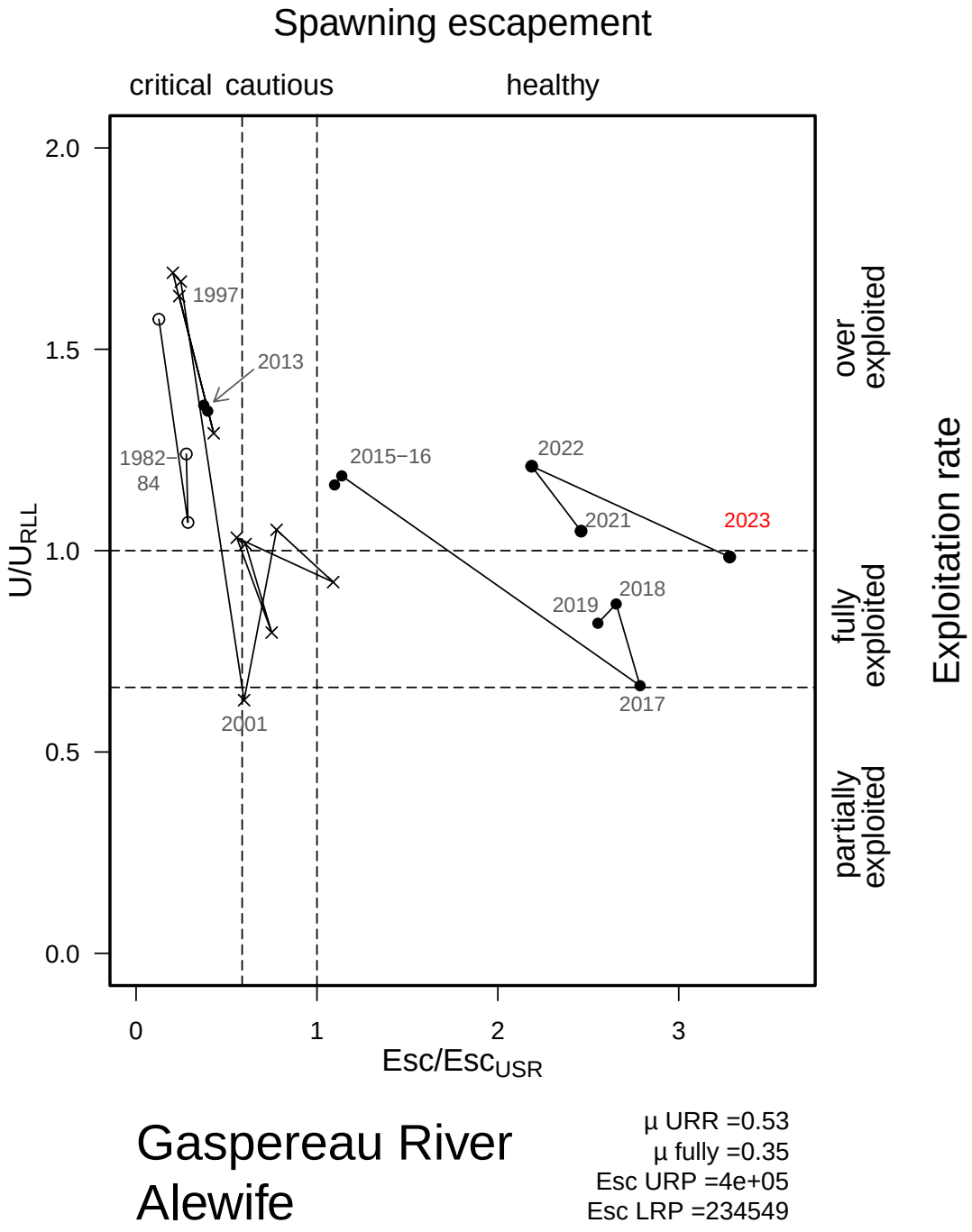

Figure 3. Stock status plot for the Gaspereau River Alewife stock. Each point indicates status in a single year, and the lines connect the points in sequence. Stock status from 1982-1984 are show using open circles, status from 1997-2006 are shown using an X, and for 2013-19 and 2021-2022 using closed circles. The plot is updated from Gibson et al. 2017.

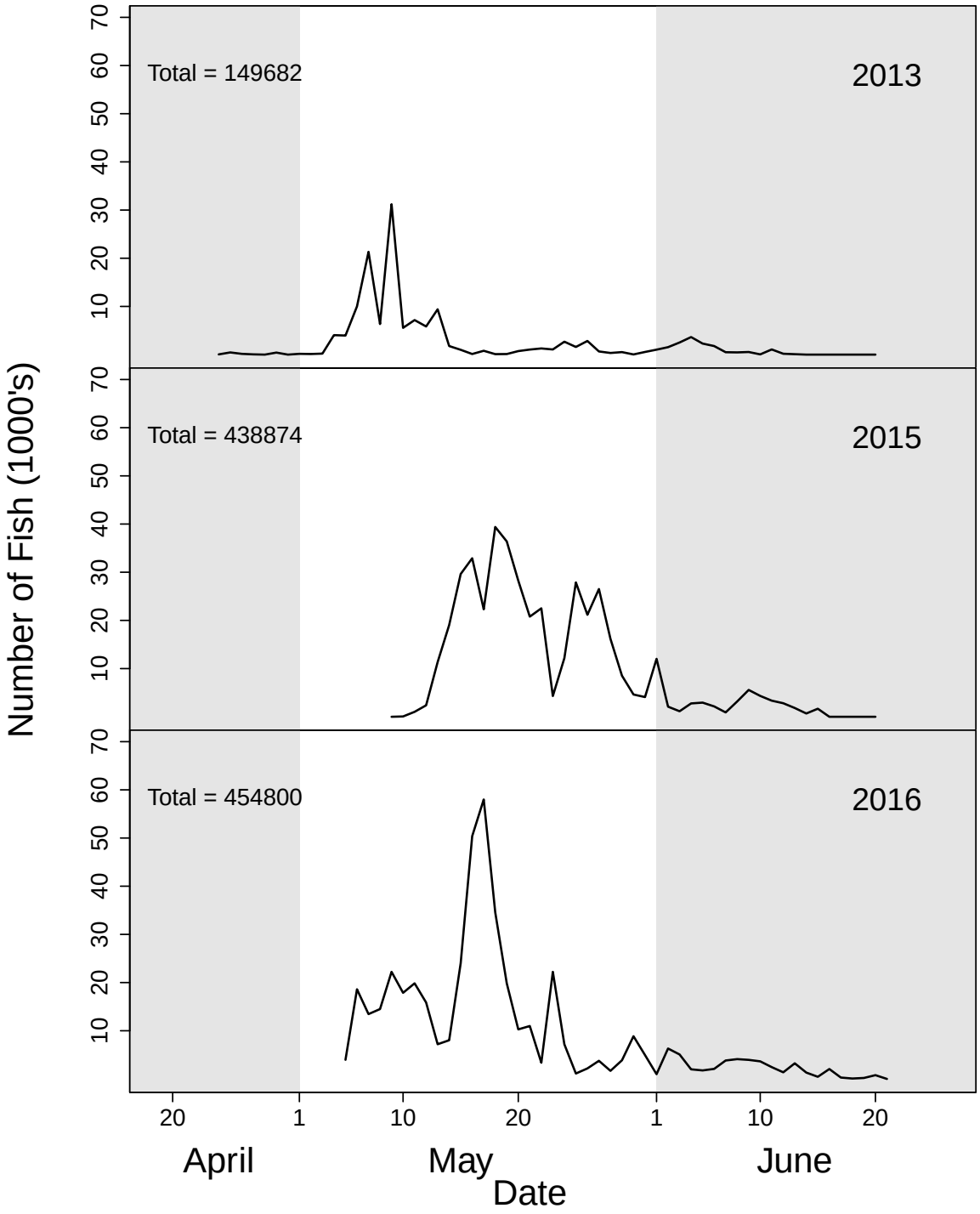

Figure 4. Estimated number of Alewife ascending the White Rock fish ladder in 2013, 2015 and 2016.

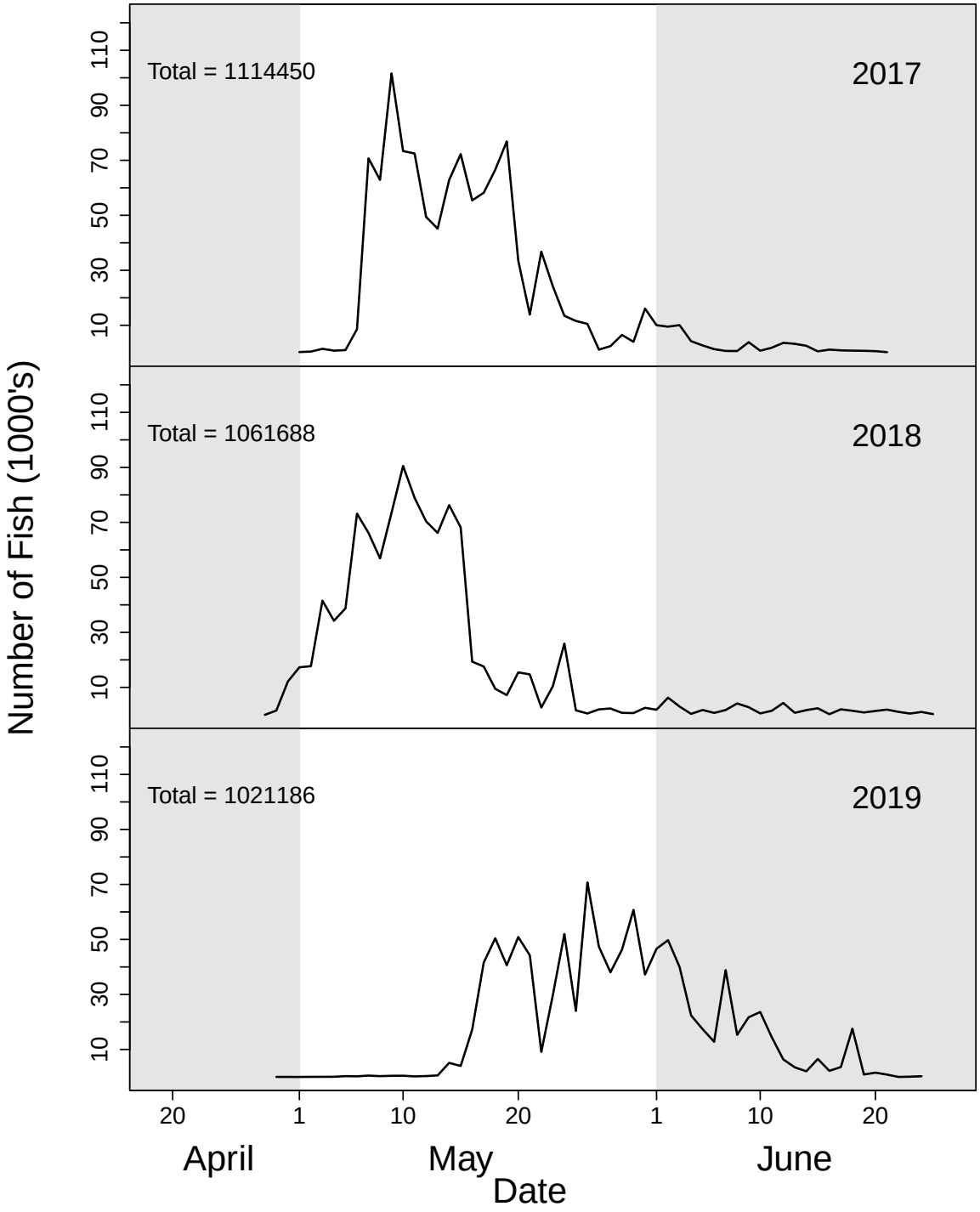

Figure 5. Estimated number of Alewife ascending the White Rock fish ladder in 2017-2019.

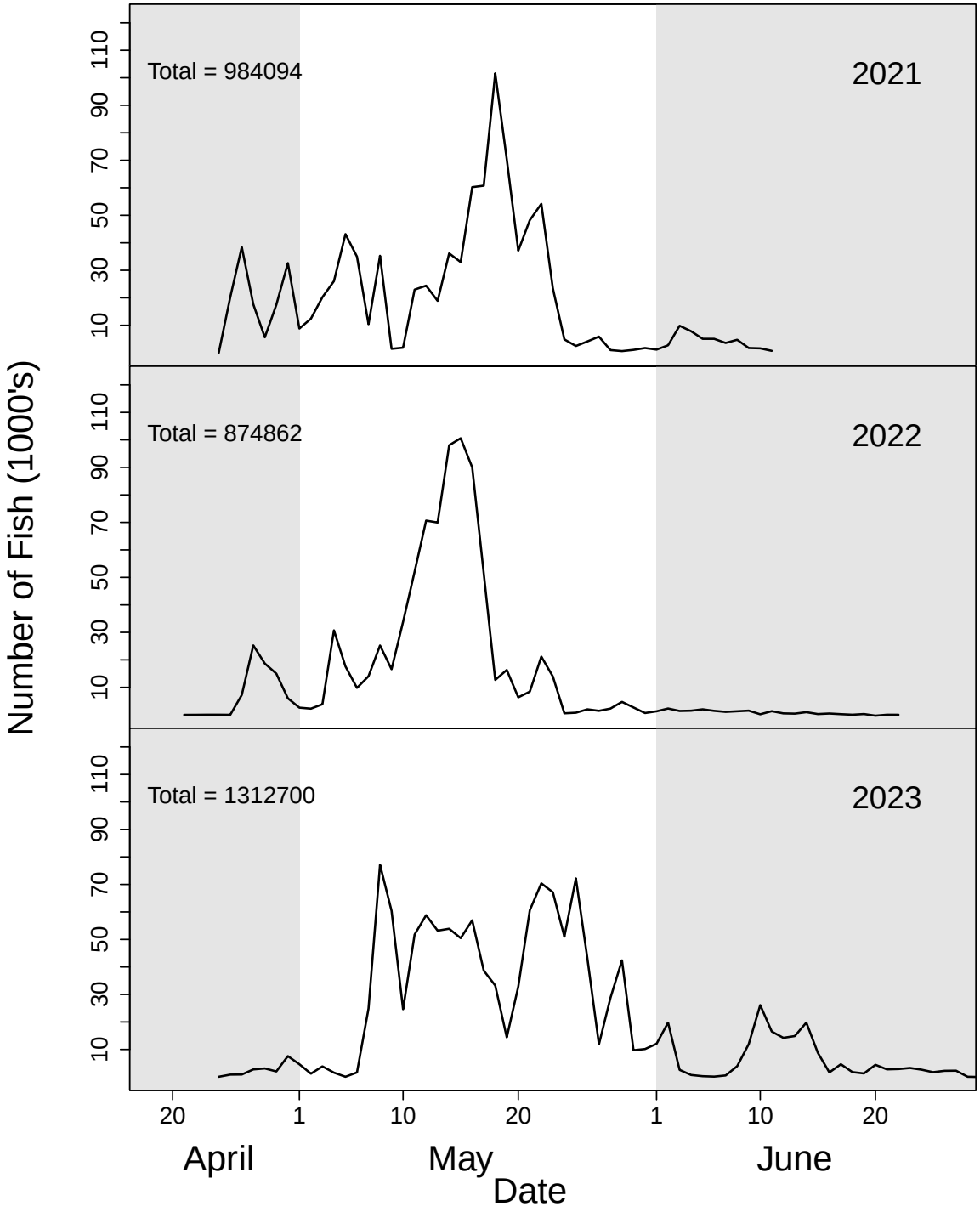

Figure 6. Estimated number of Alewife ascending the White Rock fish ladder in 2021-20123.

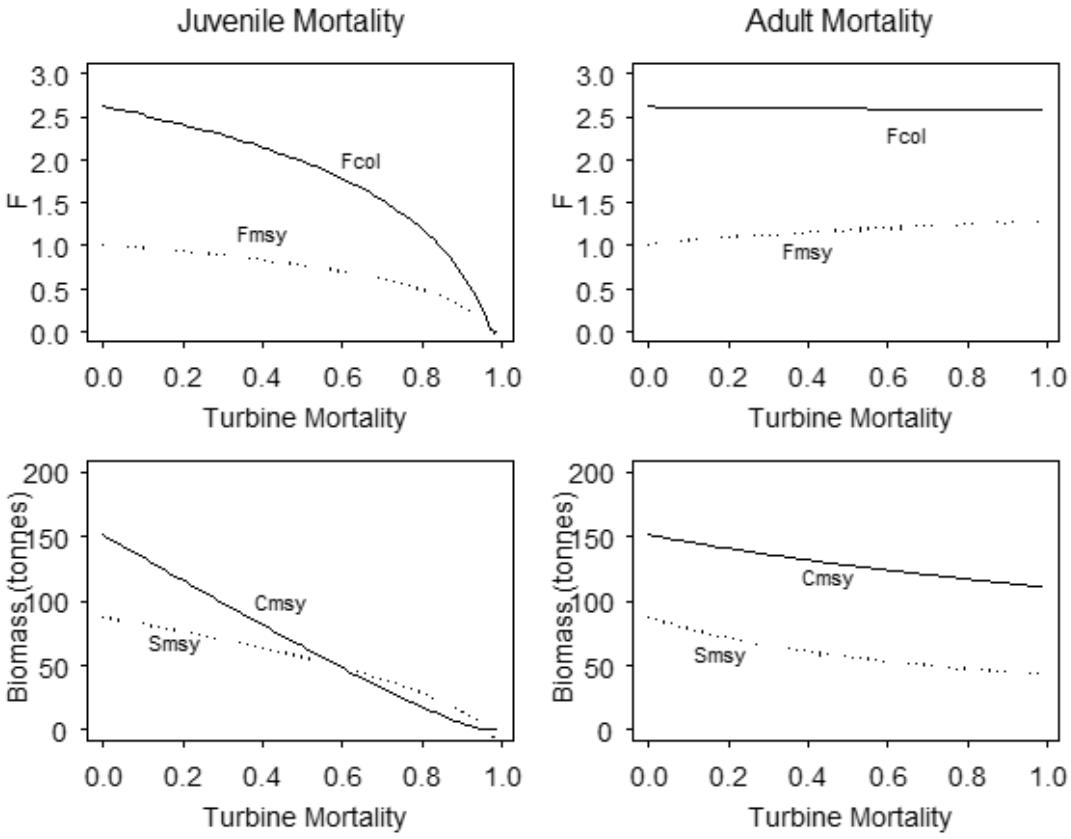

Figure 7. The relationship between juvenile (left column) and adult (right column) and fishery reference points for Gaspereau River Alewife. F^{msy}, S^{msy} and C^{msy} are the equilibrium fishing mortality rate, spawner biomass and catch at MSY. F^{col} is the fishing mortality rate that will drive the population to extinction. Juvenile turbine mortality was assumed to occur after compensatory mortality. Adult turbine mortality occurs after spawning (from Gibson et al. 2017).

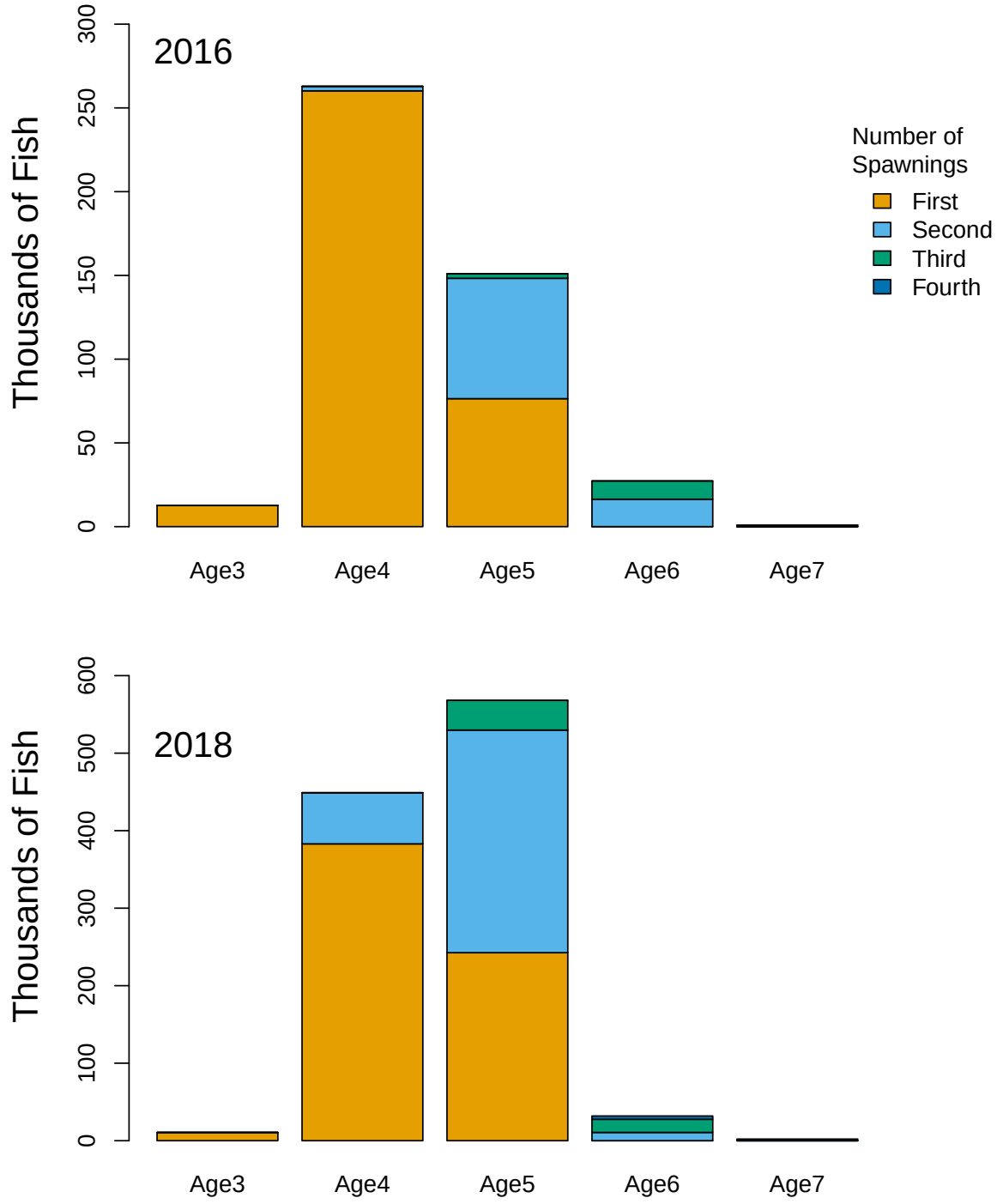

Figure 8. Estimated proportion of Alewife by age and spawning history ascending the White Rock fish ladder in 2016 and 2018.

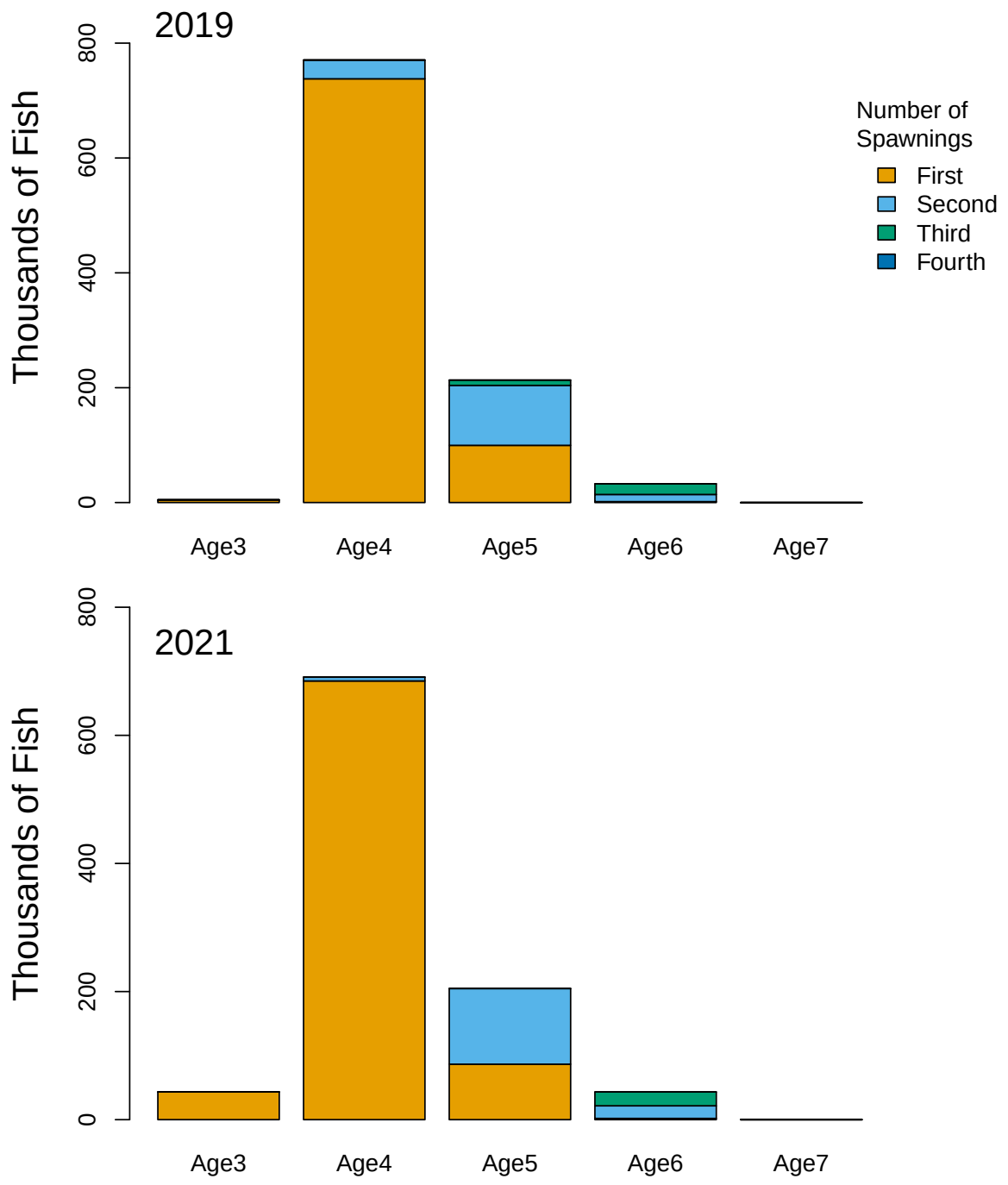

Figure 9. Estimated proportion of Alewife by age and spawning history ascending the White Rock fish ladder in 2019 and 2021.

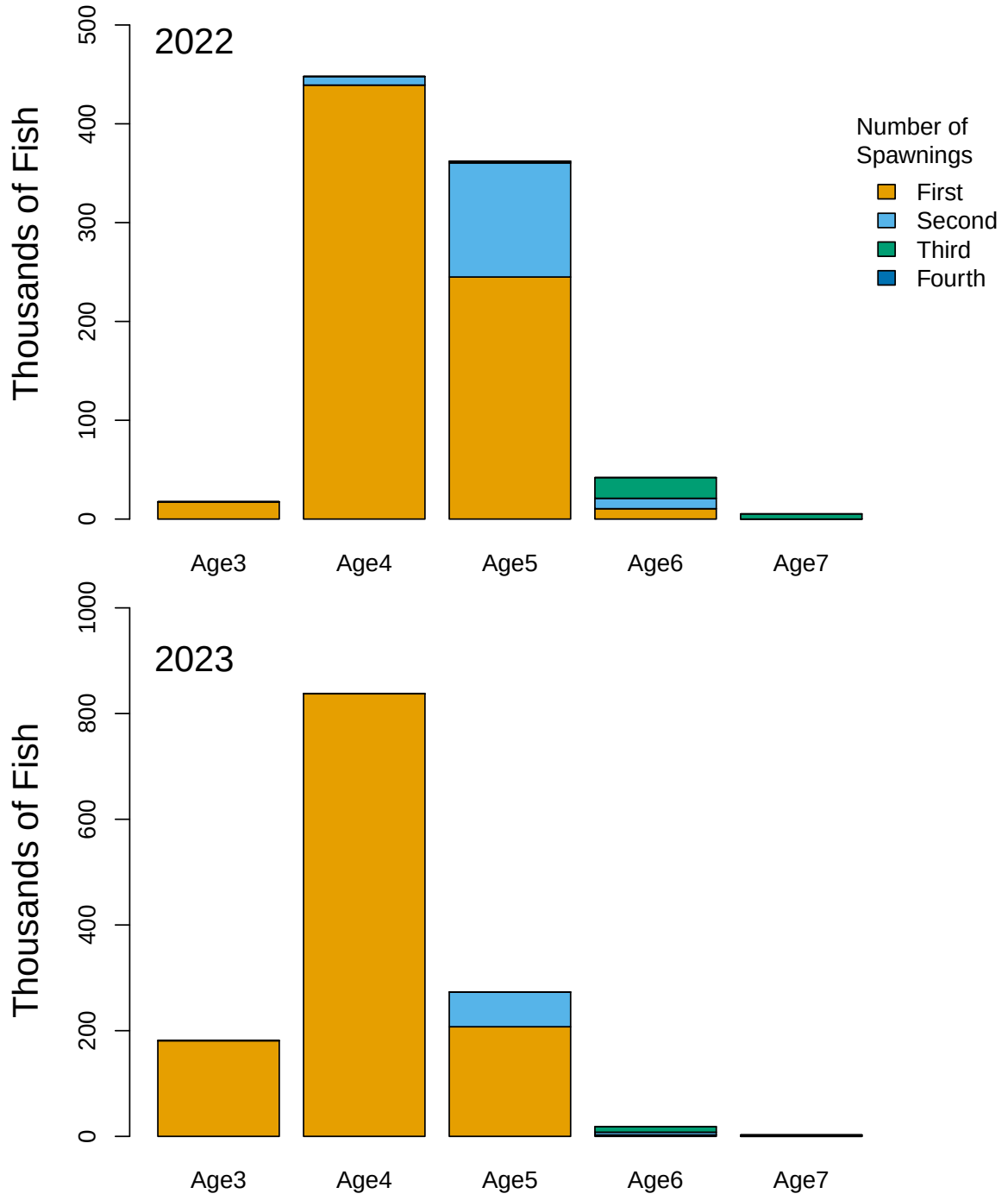

Figure 10. Estimated proportion of Alewife by age and spawning history ascending the White Rock fish ladder in 2022.

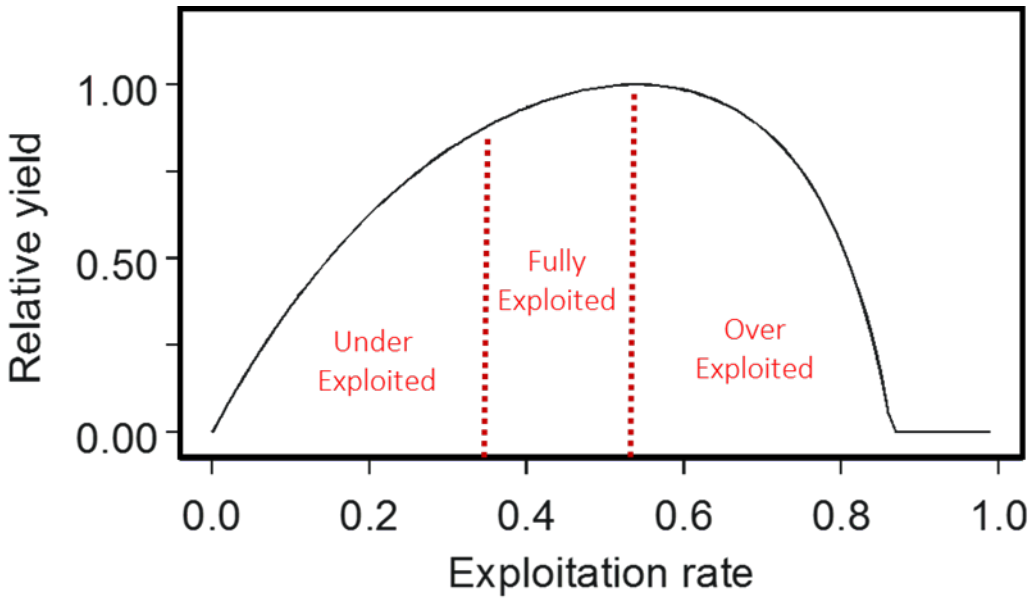

Figure 11. Yield curve showing the relationship between the exploitation rate (the proportion of the spawning run harvested) and the yield from the fishery. The three zones correspond to the removal reference levels provided in Table 2. Adapted from Gibson et al. (2017).

References

Gibson, A. J. F., H. D. Bowlby, F. M. Keyser. 2017. A Framework for the Assessment of the Status of River Herring Populations and Fisheries in DFO's Maritimes Region. Canadian Science Advisory Secretariat Research Document 2016/105. Fisheries and Oceans Canada, Ottawa.

McIntyre, T. M., Bradford, R. G., Davies, T. D., and Gibson, A. J. F. 2007. Gaspereau River alewife stock status report. Canadian Science Advisory Secretariat Research Document 2007/032. Fisheries and Oceans Canada. Ottawa. 1-35.