



United States Department of the Interior

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MEMORANDUM

TO: Patrick Devers, Acting Chief, Branch of Assessment and Decision Support

FROM: Joshua Dooley, Goose Biologist, Branch of Assessment and Decision Support

DATE: 28 August 2026

SUBJECT: Atlantic Brant Integrated Population Model 2027 Midwinter Abundance Prediction

In 2020, the Atlantic Flyway Council adopted the use of an integrated population model (IPM; Roberts et al. 2021) to inform harvest management decisions for Atlantic brant (*Branta bernicla hrota*). The Atlantic brant harvest strategy established regulatory thresholds relative to the IPM out-year prediction of the midwinter population size (Table 1) and consideration of status and trends in productivity. The Atlantic brant IPM predicted 2027 midwinter mean population size was 138,000 (95% CI = 106,000–181,000; Figure 1, Table 3).

Input data included age ratios and Midwinter Survey counts during 1975–2026, band-recovery data from summer 1975 through the 2025–2026 hunting season, and selected hunting regulations through the 2026–2027 hunting season (Table 2). The predicted IPM adult harvest probability for the 2026–2027 hunting season is 0.030 (95% CI = 0.025–0.037; Table 3). Adult survival probabilities in recent years were >0.85 and relatively stable.

In consultation with the Atlantic Flyway Migratory Game Bird Technical Section Snow Goose, Brant, and Swan (SNOBS) Committee, 3 technical updates were made to the Atlantic Brant IPM in 2026 for the 2027–2028 regulatory season that improved the model's performance: using updated band reporting rates for years after 2011 (Table 1), using more predictive covariates in the productivity sub-model to better reflect findings of Didonato (2022; i.e., June North Atlantic Oscillation [NAO] values and the previous year's midwinter survey count [e.g., the 2025 January MWS count was the last observed data point for the 2026 November fall age ratio prediction), and using wider (more vague) prior values to model the error terms on the survival and productivity parameters (see Dooley 2026 for additional details).

LITERATURE CITED

- Didonato, F, M. 2022. The demography of Atlantic brant (*Branta bernicla hrota*).
Master's thesis, University of Missouri – Columbia.
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- Dooley, J. L. 2026. Atlantic Brant IPM: Evaluation of Updated Band Reporting Rates and Modifications to the Productivity and Survival Sub-Models. Unpubl. report. to the Atlantic Flyway. U.S. Fish and Wildlife Service, Portland, OR. June 2026.
- Roberts, A. J., J. L. Dooley, B. E. Ross, T. C. Nichols, J. L. Leafloor, and K. W. Dufour. 2021. An integrated population model to inform harvest management of Atlantic brant. *Journal of Wildlife Management* 85:897-908

Table 1. Current Atlantic brant harvest strategy showing population abundance thresholds and corresponding hunting regulations.

Abundance threshold (IPM out-year prediction)	Package	Regulations (Days/Bag)
>150K	Liberal	60/2
Between 115–150K	Standard	50/2
Between 100–115K	Restrictive	30/1
<100K	Closed	0/0

Table 2. Input data included in the Atlantic brant integrated population model and summarized band-recovery data, 1975–2026.

Year	Midwinter survey	Age ratio	Hunting regulations		Reporting prob.		North Atlantic Oscillation
	total count	prop. juv	days	bag	mean	SD	June value
1975	88,408	NA	30	4	0.290	0.035	-0.840
1976	127,028	0.089	0	0	0.296	0.035	0.800
1977	73,791	0.295	0	0	0.308	0.034	-0.570
1978	46,690	0.059	0	0	0.317	0.029	1.380
1979	42,018	0.410	0	0	0.313	0.028	1.600
1980	59,195	0.337	0	0	0.302	0.026	-0.370
1981	97,029	0.213	30	2	0.316	0.029	-0.450
1982	104,432	0.235	30	2	0.331	0.030	-1.630
1983	123,515	0.323	50	2	0.344	0.031	0.990
1984	127,317	0.213	50	4	0.355	0.031	-0.420
1985	146,325	0.158	50	4	0.370	0.034	-0.800
1986	110,368	0.037	30	2	0.372	0.036	1.220
1987	110,428	0.265	30	2	0.380	0.034	-1.820
1988	131,183	0.264	50	2	0.387	0.027	0.880
1989	137,939	0.210	50	2	0.397	0.030	-0.270
1990	135,444	0.109	50	2	0.386	0.031	-0.020
1991	147,744	0.245	50	2	0.406	0.034	-0.820
1992	184,780	0.022	50	2	0.415	0.038	0.200
1993	100,603	0.212	30	2	0.431	0.042	-0.590
1994	162,184	0.102	50	2	0.449	0.043	1.520
1995	148,172	0.216	50	2	0.454	0.045	0.130
1996	105,903	0.154	30	2	0.496	0.043	0.560
1997	137,567	0.175	50	2	0.651	0.037	-1.470
1998	137,974	0.241	50	2	0.707	0.035	-2.720
1999	171,630	0.015	50	2	0.722	0.032	1.120
2000	157,156	0.251	50	2	0.714	0.031	-0.030
2001	145,259	0.247	50	2	0.719	0.031	-0.200
2002	181,620	0.070	60	3	0.715	0.025	0.380
2003	164,526	0.172	60	3	0.726	0.024	-0.070
2004	129,582	0.131	50	2	0.744	0.017	-0.890
2005	123,248	0.166	30	2	0.752	0.024	-0.050
2006	146,639	0.243	30	2	0.753	0.027	0.840
2007	150,559	0.311	50	2	0.777	0.025	-1.310
2008	161,612	0.211	60	3	0.766	0.028	-1.390
2009	151,273	0.094	50	2	0.765	0.030	-1.210
2010	139,350	0.133	50	2	0.776	0.030	-0.820
2011	148,886	0.252	50	2	0.794	0.029	-1.280
2012	149,157	0.074	50	2	0.812	0.030	-2.530
2013	111,750	0.037	30	2	0.829	0.030	0.520
2014	132,936	0.095	30	2	0.847	0.031	-0.970
2015	111,434	0.092	30	1	0.865	0.032	-0.070
2016	157,899	0.247	60	2	0.883	0.032	-0.430
2017	161,661	0.178	60	2	0.900	0.033	0.050
2018	169,749	0.015	60	2	0.900	0.033	1.090
2019	120,109	0.105	30	2	0.900	0.033	-1.090
2020	139,875	0.112	50	2	0.900	0.033	-0.150
2021	—	0.074	50	2	0.900	0.033	0.770
2022	109,194	0.086	50	2	0.900	0.033	-0.120
2023	121,475	0.199	30	1	0.900	0.033	-0.580
2024	112,842	0.167	30	1	0.900	0.033	-0.090
2025	133,891	0.129	30	1	0.900	0.033	0.700
2026	136,799	—	30	1	0.900	0.033	0.100

Table 3. Atlantic brant integrated population model posterior estimates of midwinter population size and adult survival and harvest probabilities, 1976–2027.

Year	IPM midwinter population size (in thousands)		Adult survival prob.		Adult harvest prob.	
	median	95% CI	median	95% CI	median	95% CI
1976	70	(57-86)	0.756	(0.704-0.920)	0.024	(0.020-0.030)
1977	58	(49-69)	0.774	(0.707-0.955)	0.025	(0.020-0.031)
1978	58	(50-67)	0.907	(0.742-1.005)	0.025	(0.020-0.031)
1979	51	(45-58)	0.959	(0.832-1.013)	0.024	(0.019-0.030)
1980	68	(60-76)	0.997	(0.944-1.024)	0.022	(0.017-0.026)
1981	93	(82-104)	0.936	(0.817-0.984)	0.052	(0.044-0.061)
1982	108	(97-121)	0.883	(0.737-0.984)	0.041	(0.034-0.049)
1983	126	(113-140)	0.789	(0.686-0.946)	0.052	(0.044-0.062)
1984	144	(130-159)	0.739	(0.648-0.905)	0.083	(0.069-0.099)
1985	142	(128-158)	0.823	(0.674-0.937)	0.082	(0.068-0.099)
1986	129	(115-143)	0.774	(0.700-0.936)	0.034	(0.028-0.041)
1987	107	(96-119)	0.753	(0.695-0.914)	0.035	(0.029-0.042)
1988	127	(115-141)	0.725	(0.677-0.862)	0.048	(0.040-0.057)
1989	136	(123-151)	0.772	(0.689-0.953)	0.045	(0.037-0.054)
1990	142	(129-158)	0.891	(0.722-0.984)	0.044	(0.037-0.053)
1991	137	(124-152)	0.745	(0.683-0.912)	0.046	(0.038-0.055)
1992	157	(142-173)	0.898	(0.735-0.985)	0.045	(0.037-0.054)
1993	133	(121-147)	0.825	(0.707-0.978)	0.036	(0.029-0.043)
1994	152	(138-167)	0.742	(0.681-0.883)	0.047	(0.039-0.056)
1995	136	(123-151)	0.787	(0.692-0.950)	0.046	(0.038-0.054)
1996	133	(120-148)	0.904	(0.747-0.995)	0.034	(0.028-0.041)
1997	137	(123-152)	0.729	(0.678-0.880)	0.049	(0.041-0.058)
1998	141	(127-156)	0.896	(0.737-0.987)	0.042	(0.035-0.050)
1999	163	(148-180)	0.911	(0.764-0.989)	0.042	(0.035-0.050)
2000	146	(133-160)	0.852	(0.730-0.969)	0.044	(0.037-0.053)
2001	170	(155-185)	0.793	(0.705-0.907)	0.043	(0.037-0.050)
2002	181	(166-197)	0.768	(0.678-0.873)	0.074	(0.065-0.085)
2003	147	(135-161)	0.712	(0.659-0.802)	0.075	(0.066-0.085)
2004	138	(126-151)	0.957	(0.875-0.994)	0.043	(0.037-0.049)
2005	134	(122-147)	0.696	(0.666-0.755)	0.057	(0.051-0.065)
2006	144	(132-157)	0.693	(0.668-0.728)	0.049	(0.042-0.055)
2007	139	(127-151)	0.789	(0.714-0.880)	0.050	(0.044-0.057)
2008	154	(141-167)	0.891	(0.789-0.948)	0.080	(0.071-0.091)
2009	158	(143-173)	0.814	(0.719-0.919)	0.057	(0.050-0.065)
2010	139	(127-152)	0.774	(0.701-0.872)	0.047	(0.041-0.054)
2011	131	(120-143)	0.944	(0.847-0.993)	0.042	(0.037-0.048)
2012	149	(137-164)	0.851	(0.745-0.948)	0.064	(0.057-0.072)
2013	144	(132-157)	0.838	(0.729-0.959)	0.034	(0.030-0.040)
2014	129	(118-140)	0.823	(0.731-0.939)	0.028	(0.024-0.032)
2015	124	(113-136)	0.964	(0.863-1.014)	0.022	(0.019-0.026)
2016	121	(111-133)	0.903	(0.804-0.984)	0.039	(0.034-0.045)
2017	153	(140-167)	0.904	(0.796-0.982)	0.044	(0.039-0.050)
2018	160	(146-175)	0.785	(0.695-0.898)	0.065	(0.058-0.073)
2019	132	(122-144)	0.948	(0.844-0.990)	0.046	(0.040-0.052)
2020	127	(114-141)	0.707	(0.668-0.810)	0.057	(0.050-0.065)
2021	130	(113-151)	0.928	(0.796-0.993)	0.039	(0.034-0.045)
2022	110	(99-124)	0.910	(0.786-0.983)	0.044	(0.039-0.051)
2023	110	(99-121)	0.959	(0.844-1.010)	0.027	(0.023-0.031)
2024	122	(110-135)	0.964	(0.852-1.008)	0.031	(0.026-0.036)
2025	132	(119-146)	0.869	(0.711-0.994)	0.034	(0.030-0.040)
2026	133	(118-150)	0.885	(0.849-0.918)	0.030	(0.025-0.037)
2027	138	(106-181)				

Figure 1. Atlantic brant integrated population model posterior estimates of midwinter population size (mean [red line] and 95% credible interval [red shading]) during 1975–2026 and the out-year 2027 prediction. Midwinter survey (MWS) counts are shown as black circles.

