George Matz
PO Box 15182
Fritz Creek, AK 99603

Alaska Board of Game
PO Box 115526
Juneau, AK 99811-5526

February 28, 2023

Re: BOG Southcentral Region Meeting

Oppose Proposal 163 which seeks to "Rescind the bag limit restrictions for sea duck hunting in Unit 15C."

I oppose this proposal because it is based on an outdated understanding of sea duck populations in Kachemak Bay, and it is not a sustainable approach to local waterfowl management. To be sustainable harvest regulations need to be based on what wildlife populations are now, regardless of reasons for change, not how they use to be decades ago.

An example of misunderstanding is the statement in the proposal that says, "There is no documented biological problem indicating low population levels or substantial declines for eiders, harlequin ducks or long-tailed ducks (nor for buffleheads or goldeneyes that are the subject of current discussion by local supporters of restrictions)."

This statement clearly ignores many recent scientific studies that have warned of recent avian population declines in North America, including sea ducks. For example, national attention has been given to a massive study published in *Science* in 2019 entitled *Decline of North American Avifauna* by Rosenberg et al. The study concludes, "Cumulative loss of nearly three billion birds since 1970, across most North American biomes, signals a pervasive and ongoing avifaunal crisis."

A more recent study building on that is *State of the Birds 2022* which has information specific to sea ducks. Below is information copied from that report.

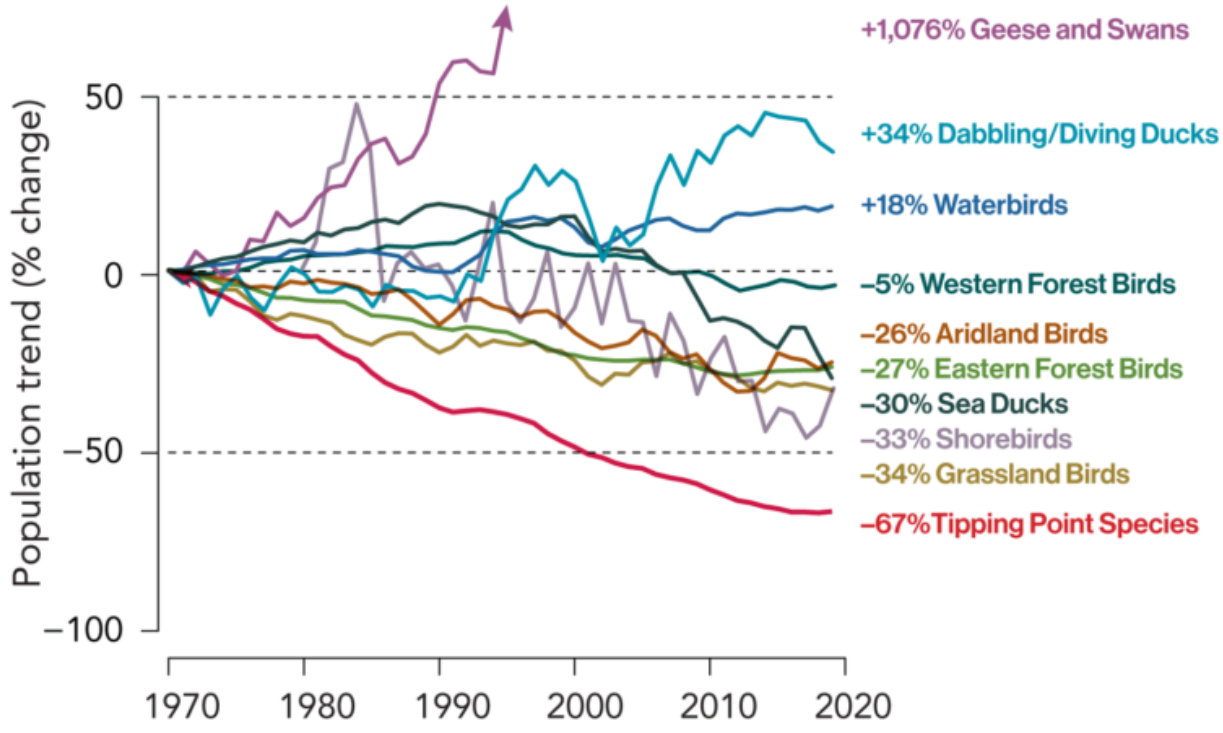
State of the Birds 2022
State of the Birds Report Reveals Widespread Losses of Birds in All Habitats–Except for One

Published by 33 leading science and conservation organizations [including Ducks Unlimited] and agencies.

The United States and Canada have lost 3 billion breeding birds since 1970—a loss of 1 in 4 birds, according to research published in Science in 2019.

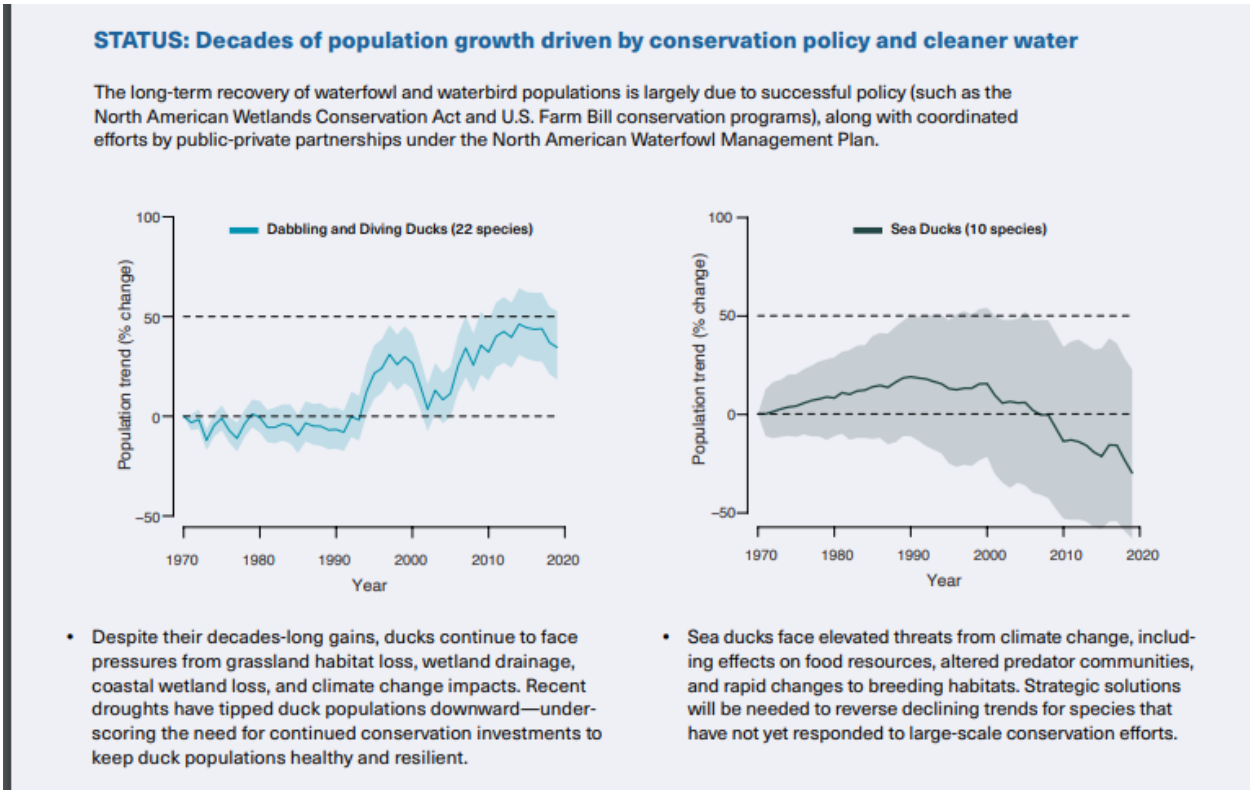
In 50 years, birds have increased overall in wetlands, a singular exception that shows the way forward for saving birds and benefiting people.

Trends for breeding bird species by group or by habitat during 1970–2019, except for the shorebirds trend, which begins in 1980.



Note that there has been a 30% drop in sea duck populations since 1970. Most of that has occurred since 2000.

As illustrated below, sea duck populations have been in decline since the late 1990's, for a variety of reasons. While hunting may be a contributing factor in some cases, other factors also need to be considered. On the other hand, dabbling and diving ducks have seen steady increases starting in the 1990's. The report gives hunters, through their conservation efforts such as protecting wetlands, some of the credit for recovery of dabbling and diving ducks.



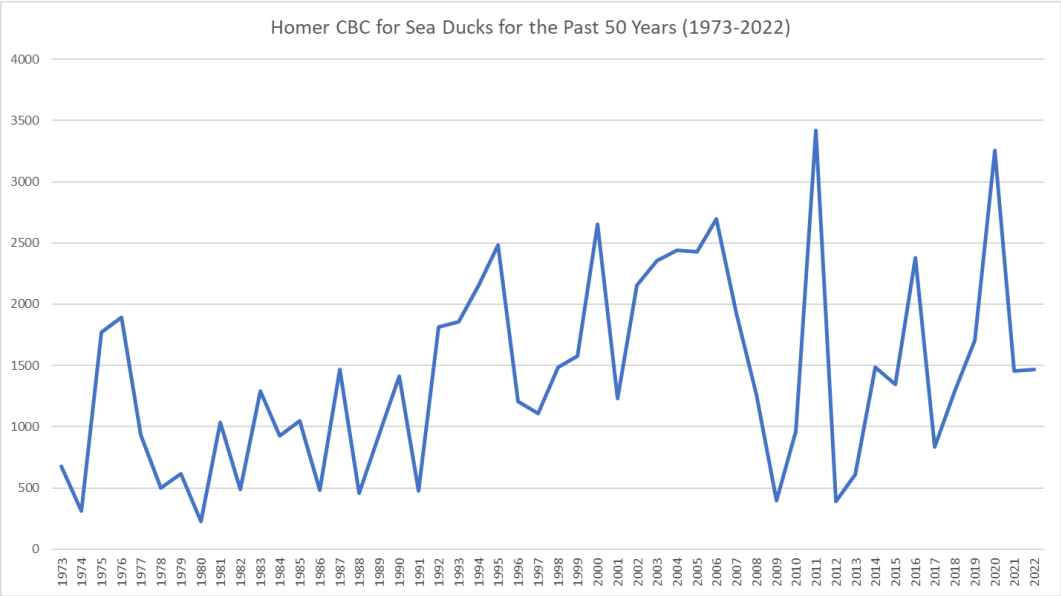
The sea duck species included in the chart above includes the following.

			1970 - 2019 Change (%/yr)			3 Generation Change (%/yr)				
Common Name	Survey	aou	Trend	2.5% Ci	97.5%CI	Trend	2.5% Ci	97.5%CI	Tipping Pc	Group
Barrow's Goldeneye	CBC	1520	1.378791	0.668384	2.146883	2.198171	0.115315	4.144726		Sea Ducks
Black Scoter	CBC	1630	-2.46548	-4.34899	-0.52183	-1.99666	-6.64932	3.421374	x	Sea Ducks
Bufflehead	CBC	1530	0.553625	-0.70017	1.817735	1.958054	1.054071	2.912006		Sea Ducks
Common Eider	CBC	1590	-6.3177	-19.287	8.326944	-0.2218	-34.699	51.19761		Sea Ducks
Common Goldeneye	CBC	1510	-0.3054	-1.15867	0.433434	0.352486	-1.38344	2.130719		Sea Ducks
Harlequin Duck	CBC	1550	0.555404	-0.7514	1.885391	0.709002	-3.28695	4.249297		Sea Ducks
King Eider	CBC	1620	-8.27663	-10.0931	-6.34576	-10.2039	-14.5972	-5.88514	x	Sea Ducks
Long-tailed Duck	CBC	1540	-3.63733	-5.47278	-1.74929	-3.71028	-7.32608	0.216084		Sea Ducks
Surf Scoter	CBC	1660	0.187609	-0.22364	0.598399	0.553777	-0.68216	1.756389		Sea Ducks
White-winged Scoter	CBC	1650	-1.25488	-2.83111	0.319645	-0.63442	-5.00216	3.889426		Sea Ducks

Of the ten species listed in the table, six have negative population trends from 1970-2019. All ten species occur in Kachemak Bay, although King Eider are considered rare.

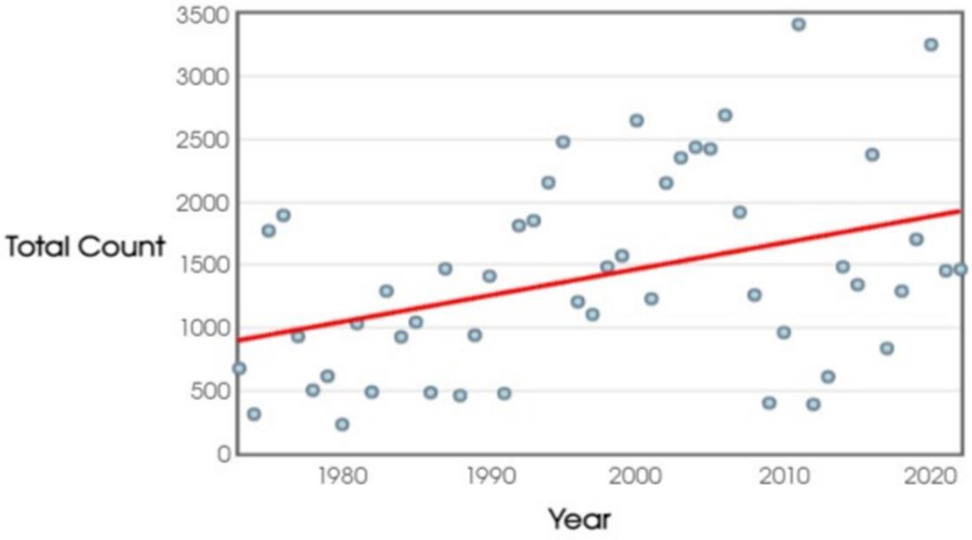
While it should be clear that sea duck populations are in decline in North America, that doesn't necessarily apply to Kachemak Bay. Some verification is needed. But finding datasets in Alaska that go back fifty years or more is rare. However, the Homer Christmas Bird Count (CBC) was started in 1960 and has been done every year since 1973- fifty consecutive years. And as one might expect, waterbirds (including sea ducks) have been prominent species on Homer CBC lists. It should also be noted that several other coastal cities in Alaska have overwintering sea ducks and annual CBC's. Cumulatively, this database could provide a broader statewide perspective of sea duck populations and should be part of ADF&G's analysis.

I recently did an analysis of the Homer CBC data to see what trends might be apparent. To get to the bottom-line, the scatter chart below illustrates the total sea duck count for the Homer CBC for the past 50 years. See Appendix A for the text of the full report, Appendix B for spreadsheets, and Appendix C and D for graphs.



As you can see there is a lot of variation from year-to-year, but it appears as if there might be an upward trend for Homer. Illustrated below is a Simple Linear Regression which gives a better sense of the direction.

Homer CBC Sea Duck Count for 55 Years (1973-2022)

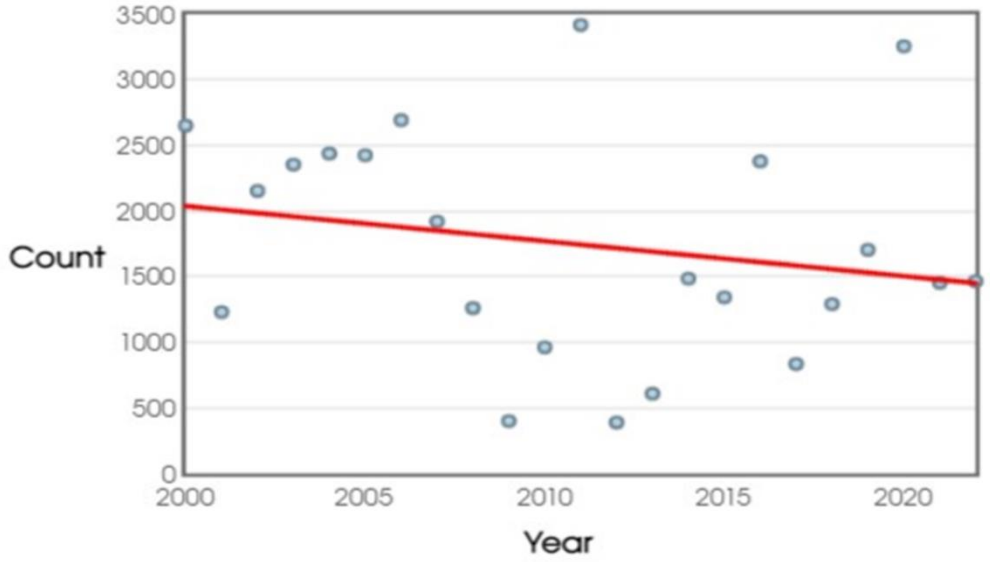


However, as shown in CBC details (https://www.audubon.org/conservation/science/christmas-bird-count), in Homer there has also been a steady trend in Homer towards more volunteers. The

number of volunteers went from 1,3, and 4 volunteers the first three years to 34, 35, and 30 volunteers the last three years. Is the upward trend based to some degree on more volunteer participation?

Since 2005 when there were 14 volunteers, the number of volunteers has been in the 20's and 30's, averaging 27.6 for the past 16 years on record. This timeframe happens to roughly coincide with the national decline in sea ducks. So, to minimize the variables in order to test how well sea duck national trends fit the Homer CBC data, it might be better to just compare the two from 2000 on.

Homer CBC Sea Duck Count 23 Years (2000-2022)



When that is done, the Homer CBC data closely matches national trends. Going from a count of about 2,000 in the year 2000 to about 1,500 in 2022 is about a 25% decline, slightly less than the national trend for the past 50 years. But if this decline is due in part to breeding habitat loss as stated earlier, I would expect Alaska to be a bit less since what is the national trend because it probably has had less loss of breeding habitat.

Appendix C and D provide a more detailed, species/taxa look at the Homer CBC, both in terms of the last 50 years and since 2000. Contrary to what Proposal 163 claims, the Homer CBC does show declines for several species of sea ducks. During the last 22 years there have been declines with scoters, Long-tailed Ducks, mergansers, Harlequin Duck, and eiders. While the area covered by the Homer CBC includes the Homer Spit, which is a small fraction of Kachemak Bay, there is no reason to expect any substantial difference in sea duck presence between the Homer Spit and other parts of Kachemak Bay.

Proposal 163 disparages “anecdotal or biased claims” and it seems this is meant to apply to databases like the CBC. But CBC data is by no means anecdotal. It has been following essentially the same well tested protocol for the past 122 years. Observations are by established subsections of the counting circle and reviewed by skilled birders before being submitted and entered into the CBC database. This is an open access database that is used by many scientists and avid birders. Audubon, who maintains the database, says that “CBC data have been used in hundreds of analyses, peer-reviewed publications, and government reports over the decades.”

The bottom-line in this discussion is that despite the assertion by Proposal 163 that “The [previous] reductions in bag limits for eiders, harlequin ducks and long-tailed ducks were not based on best available scientific data,” there is solid evidence to the contrary. On national scale the prestigious journal *Science* says otherwise. And on a Kachemak Bay scale, the Homer CBC data for sea ducks seems to reasonably match national data for the past two decades. Also, it shows that there has been a decline with some sea duck species over the last two decades, which generally supports anecdotal observations by astute long-term residents who have been closely watching where they live for many decades and have voiced concern these declines.

To rescind previous sea duck restrictions, as advocated by Proposal 163, would most likely continue the population decline that sea ducks have experienced over the past two decades. That would be unacceptable to most of those who live in the Kachemak Bay area who want to see sea duck populations restored to what they use to be, or as close to that as possible, recognizing that climate change may also be a factor to contend with. This would be to the benefit of sea duck hunters and everyone else.

Sincerely,
George Matz
Fritz Creek, AK

Appendix A

Kachemak Bay Waterfowl and
Fifty Years of Homer Christmas Bird Counts

by

George Matz

The Christmas Bird Count (CBC), sponsored by the National Audubon Society, is "the longest-running citizen science survey in the world" according to Wikipedia.. The first CBC in 1900 was the inspiration of Frank Chapman who organized 27 volunteer birders to undertake CBCs at 25 sites ranging from cities in the northeastern United States to Toronto, Ontario, to California. The CBC now happens annually in over 20 countries in the western hemisphere. Last year, a pandemic recovery year, there were 2,646 counts with a total number of 76,880 observers comprised of 64,882 in the field and 11,998 at feeders. Birders saw 2,554 species, plus 483 identifiable forms and hybrids and 42,876,395 birds of all species tallied.

The protocol used at the first CBC is essentially the same as what we use now. Between December 14 and January 5, count volunteers follow specified routes through a designated 15-mile (24-km) diameter circle, counting every bird they see or hear over a 24-hour period. These reports are given to a complier who reviews the data for accuracy and then submits the results to the National Audubon Society who compiles and archives all the results. The longevity of this effort and that a protocol has been consistently followed has created a valuable database for scientific study. Audubon says, "CBC data have been used in hundreds of analyses, peer-reviewed publications, and government reports over the decades."

The first Homer CBC was in 1960 which used a 15-mile diameter circle with its center in Mud Bay. This circle is still being used. It includes the entire Homer Spit which is all within Homer city limits. However, large portions of this circle include Kachemak Bay waters which are rich in waterbirds, even during the winter because the bay is mostly ice-free (Mud Bay being a frequent exception). Early attempts to bird the waters within the circle by boat were often stymied by winter weather. But rather than have this uncertainty embedded in our count records, use of a boat was discontinued. Now observations of Kachemak Bay waterbirds are mostly done onshore from various spit locations.

Following the inaugural year, Homer CBC's were done in 1962, 1963, 1965, 1971, and then 1973 – 2022, all using the same count circle. Fifty years continuous of data - a rare occurrence for Alaska. Recent years has seen almost an order of magnitude increase in the number of volunteers, thus providing more thorough coverage of the circle area, and perhaps, more sightings than would have been logged if participation were at the level of earlier years. The Homer CBC is now cosponsored by Kachemak Bay Birders and the Alaska Maritime NWR. Dave Erikson, the coordinator/compiler has been involved with the Homer CBC since 1976. Many volunteers have participated for decades. Stability in the coordinator and volunteers helps reduce observer bias. Also, I think long-term support by many citizen science volunteers is more reliable than agency funding.

Given the current concern in the Kachemak Bay area regarding the population status of overwintering sea ducks (including diving ducks), this 50-year Homer CBC dataset can provide valuable insight into long-term population trends. It can also provide a comparison and supplemental data to other sea duck databases, such as the more rigorous ADF&G's Kachemak Bay Wintering Waterfowl Survey. This survey has two components; 1) a near-shore boat-based survey taking several days to cover all the Kachemak Bay shoreline, and 2) is an airplane survey following transects in deeper waters. ADF&G's survey was initiated in 1999, but due to funding limitations is not done every year. There have been only 10 surveys in the last 22 years and scheduling has not been consistent, often with variable gaps.

The attached Excel tables and charts illustrate the trend lines for sea ducks (including diving ducks) that were observed in the Homer Spit area during CBCs over the past 50 years. These tables and charts were derived from an Audubon Christmas Bird Count download for the Homer CBC circle. https://www.audubon.org/conservation/science/christmas-bird-count

Sheet 1 for this file has two tables, one being all the waterfowl (geese, swans, and ducks) species included in the Audubon download. The second table has just those species that were observed in at least 50% of the CBC counts. This table doesn't have any geese or swans since these birds rarely occur in Kachemak Bay during midwinter. The ducks include dabblers, divers, and sea ducks. The only dabbler that meets the 50% criteria is the Mallard. But it was not included in further analysis since in winter it is mostly in the Mud Bay area unless that freezes over, in which case the ducks fly to the south side of the bay which is mostly outside the circle. The result is that in warm winters the Homer CBC sees lots of Mallards (one of the top species), but in cold winters there will be few if any. Although ADF&G waterfowl hunting regulations lump diving ducks (Bufflehead, Barrow's Goldeneye, and Common Goldeneye) in with dabblers using the term "general duck", they are considered sea ducks in this analysis.

To simplify matters, Sheet 2 uses the data from Sheet 1 to group these ducks into taxa. For instance, Scoters includes Black, Surf, and White-winged Scoters. This data was then used to generate scatter plots. The scatter plots do a good job of illustrating how variable things may be from year to year, but it is hard to discern whether the population for a taxon is increasing or decreasing. So, below each scatter plot are two charts for each taxon with a simple linear regression analysis. The first chart is for all 50 years and the second chart is from 2000-2022, which coincides with the years when ADF&G did their sea duck surveys. Having two charts illustrates in some cases that the 50-year population trend for a taxon may be increasing, but at a slower rate, or even decreasing, after 2000.

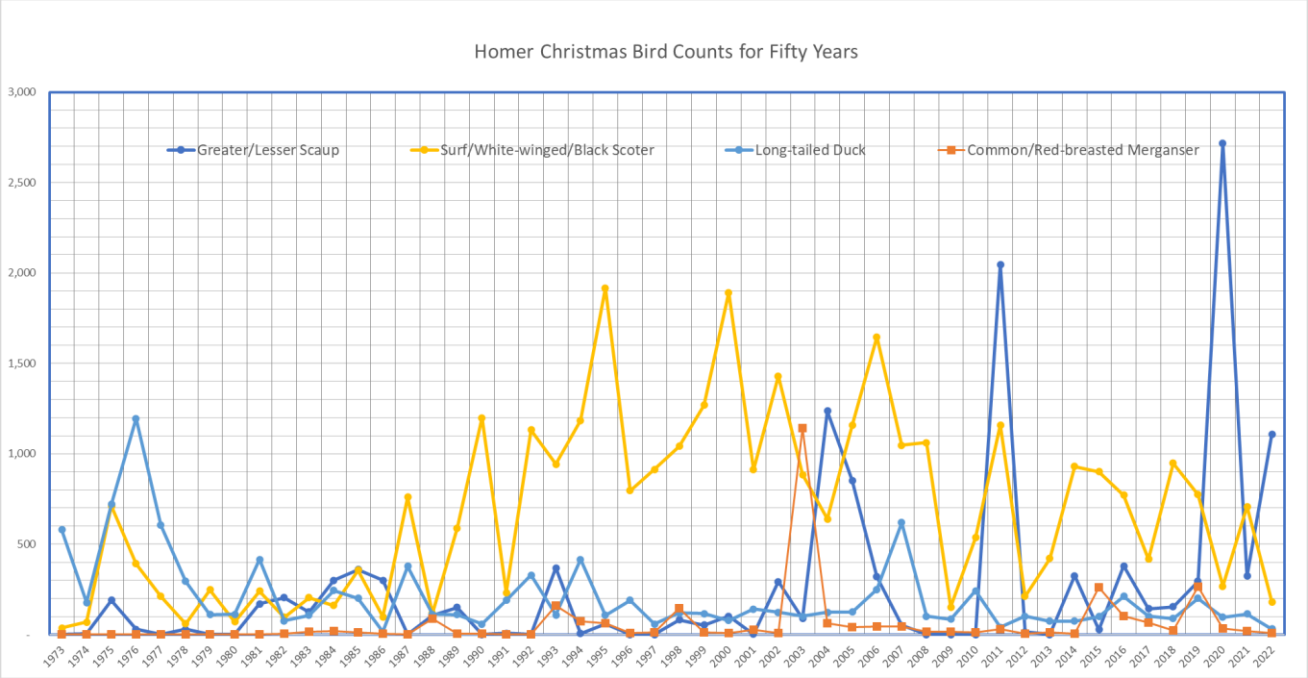
Sheet 3 is the entire Homer CBC download from Audubon which includes all species observed.

In summary, this analysis should provide a better basis for understanding population trends with sea ducks that overwinter on Kachemak Bay. It will also provide better justification for making any changes to the Alaska Waterfowl Hunting Regulations in order to sustain Kachemak Bay populations and opportunity to hunt and observe these beautiful birds.

Appendix B

Homer Christmas Bird Counts for Fifty Years (1973-2022)																												
CBC Trend Lines																												
Summarized by Taxon																												
Count Name:	Homer																											
Count Code:	AKHO																											
	1973 [74]	1974 [75]	1975 [76]	1976 [77]	1977 [78]	1978 [79]	1979 [80]	1980 [81]	1981 [82]	1982 [83]	1983 [84]	1984 [85]	1985 [86]	1986 [87]	1987 [88]	1988 [89]	1989 [90]	1990 [91]	1991 [92]	1992 [93]	1993 [94]	1994 [95]	1995 [96]	1996 [97]	1997 [98]	1998 [99]	1999 [00]		
Mallard[Anas platyrhynchos]			4	4		5			39	53	9	101	247	220	74	491	21		1		21	3	38	1			257	121	
Greater Scaup[Aythya marila]		4	190	29			1	1	40	204	125	300		300	1	106	150		8		368	7	61			82	53		
Greater/Lesser Scaup[Aythya marila/affinis]						30			130				359																
Greater/Lesser Scaup	0	4	190	29	0	30	1	1	170	204	125	300	359	300	1	106	150	0	8	0	368	7	61	0	0	82	53		
Steller's Eider[Polysticta stelleri]	8	4	41	29	49		33	8	80	8	745	111	39	19	154		26	103	23	180	199	229	204	47	66	20			
Common Eider[Somateria mollissima]	10	5	3	15	10		159	12	27	37	44	1	5	16	24	4	36	23		124	38	220	73	95	7	35	17		
Steller's/Common Eider	18	9	44	44	59	0	192	20	107	45	789	112	44	35	178	4	62	126	23	304	237	449	277	142	73	55	17		
Harlequin Duck[Histrionicus histrionicus]	39	33	84	212	24	91	44	11	49	7	31	31	39	12	17	10	16	20	12	36	10	22	19	34	4	19	35		
Surf Scoter[Melanitta perspicillata]	5	34	47	33	18		131	17	27	2	82	31	39	8	73	12	60	121	39	121	70	94	54	171	193	336	406		
White-winged Scoter[Melanitta fusca]	17	6	44	54	80	52	29	35	10	19	28	35	271	28	183	74	290	169	24	198	287	261	378	30	188	267	427		
Black Scoter[Melanitta americana]	14	17	560	306	114	8	58	20	203	75	95	95	47	63	504	32	239	828	156	690	392	819	1485	562	447	97	324		
scoter sp.[Melanitta sp.]		12	60				30											80	13	123	193	11		33	85	341	112		
Surf/White-winged/Black Scoter	36	69	711	393	212	60	248	72	240	96	205	161	357	99	760	118	589	1198	232	1132	942	1185	1917	796	913	1041	1269		
Long-tailed Duck[Clangula hyemalis]	580	178	720	1196	606	294	110	112	415	77	107	245	201	16	377	113	110	59	191	329	109	415	107	191	58	120	117		
Bufflehead[Bucephala albeola]		1	8	2		1			26	17	1	3	4	4	8	2			5	1	3	1	6	14	8	11	27		
Common Goldeneye[Bucephala clangula]	3	14	14	20	29	26	16	11	20	37	15	55	28	13	127	17	7	3		10	24	5	14	15	39	9	34		
Barrow's Goldeneye[Bucephala islandica]		3	2				1	2	4	1	3												17	7		1	8		
goldeneye sp. [Bucephala sp.]																			3										
Common/Barrow's Goldeneye	3	17	16	20	29	26	17	13	24	38	18	55	28	13	127	17	7	3	3	10	24	5	31	22	39	10	42		
Common Merganser					1		2			2	13	5				89					20	52	23	7	6	143	14		
Red-breasted Merganser[Mergus serrator]									2	2	3		13	4	2		6	5	2	2	141	1	40	1	5	3			
merganser sp.[Mergellus/Lophodytes/Mergus sp.]												15										20							
Common/Red-breasted Merganser	0	0	0	0	1	0	2	0	2	4	16	20	13	4	2	89	6	5	2	2	161	73	63	8	11	146	14		
Total	676	311	1777	1900	931	507	614	229	1072	541	1301	1028	1292	703	1544	950	961	1411	477	1814	1875	2160	2519	1208	1106	1741	1695		
Total less Mallards	676	311	1773	1896	931	502	614	229	1033	488	1292	927	1045	483	1470	459	940	1411	476	1814	1854	2157	2481	1207	1106	1484	1574		
	2000 [01]	2001 [02]	2002 [03]	2003 [04]	2004 [05]	2005 [06]	2006 [07]	2007 [08]	2008 [09]	2009 [10]	2010 [11]	2011 [12]	2012 [13]	2013 [14]	2014 [15]	2015 [16]	2016 [17]	2017 [18]	2018 [19]	2019 [20]	2020 [21]	2021 [22]	2022 [23]	nnual Count					
Mallard[Anas platyrhynchos]	442		111	2	3764	2601	1		1845	10		3151			1055	379	3422	2251	15	1937	673	160		470.58					
Greater Scaup[Aythya marila]	101	3	293	90	1237	852	185	51		1		2046	15		319	28	380	143	155	294	2711	321	1108	247.26					
Greater/Lesser Scaup[Aythya marila/affinis]							136								7						7	3	1	13.46					
Greater/Lesser Scaup	101	3	293	90	1237	852	321	51	0	1	0	2046	15	0	326	28	380	143	155	294	2718	324	1109						
Steller's Eider[Polysticta stelleri]	376	5	266	13	6	168	247	4		40	40					4			3			5		72.04					
Common Eider[Somateria mollissima]	1	13		6		3				1									1		1	5		21.42					
Steller's/Common Eider	377	18	266	19	6	171	247	4	0	41	40	0	0	0	0	4	0	0	4	0	1	10	0						
Harlequin Duck[Histrionicus histrionicus]	52	3	13	40	30	17	44	37	46	90	32	42	15	28	39	7	23	18	17	17	25	27	10	32.66					
Surf Scoter[Melanitta perspicillata]	146	77	148	81	323	152	108	82	42	86	26	32	46	30	68	31	24	13	14	23	15	64	3	77.16					
White-winged Scoter[Melanitta fusca]	483	95	81	139	33	107	80	74	17	2	111	92	21	32	14	25	16	13	19	21	17	16	26	100.36					
Black Scoter[Melanitta americana]	964	740	1141	657	264	898	1360	694	1003	65	344	635	145	360	847	845	731	392	865	729	234	628	152	458.86					
scoter sp.[Melanitta sp.]	299		59	8	20		98	197			55	400							50	1	1			45.62					
Surf/White-winged/Black Scoter	1892	912	1429	885	640	1157	1646	1047	1062	153	536	1159	212	422	929	901	771	418	948	774	267	708	181						
Long-tailed Duck[Clangula hyemalis]	79	141	124	101	123	125	250	619	101	85	243	41	101	75	74	100	212	101	89	201	97	114	32	205.6					
Bufflehead[Bucephala albeola]	53	29	13	59	42	17	20	20	34	14	12	32	29	2	28		71	48	30	62	41	31	60	18					
Common Goldeneye[Bucephala clangula]	86	82	8	18	286	46	113	95			85	56	113	70	73	44	820	40	28	92	72	222	57	62.22					
Barrow's Goldeneye[Bucephala islandica]	3	16			11	1	8	2				12			8			1	1			10		2.44					
goldeneye sp. [Bucephala sp.]									2						2						4		8	0.38					
Common/Barrow's Goldeneye	89	98	8	18	297	47	121	97	2	0	85	68	113	70	83	44	820	41	29	92	76	232	65						
Common Merganser	7	15	8	1099	64	38	30	23	13		11	23	4	12	5	190	77	27	11	185	7	4	2	44.64					
Red-breasted Merganser[Mergus serrator]	2	12		44		2	15	23	2	16	3	8	1		1	73	26	39	13	77	26	14	7	12.72					
merganser sp.[Mergellus/Lophodytes/Mergus sp.]									1						1					3				0.8					
Common/Red-breasted Merganser	9	27	8	1143	64	40	45	46	16	16	14	31	5	12	7	263	103	66	24	265	33	18	9						
Total	3094	1231	2265	2357	6203	5027	2695	1921	3106	410	962	6570	389	609	2541	1726	5802	3086	1311	3642	3931	1624	1466	1886.22					
Total less Mallards	2652	1231	2154	2355	2439	2426	2694	1921	1261	400	962	3419	389	609	1486	1347	2380	835	1296	1705	3258	1464	1466	1415.64					
Database for charts																													
Homer Christmas Bird Counts for Fifty Years (1973-2022)																													
	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999		
Greater/Lesser Scaup	0	4	190	29	0	30	1	1	170	204	125	300	359	300	1	106	150	0	8	0	368	7	61	0	0	82	53		
Surf/White-winged/Black Scoter	36	69	711	393	212	60	248	72	240	96	205	161	357	99	760	118	589	1198	232	1132	942	1185	1917	796	913	1041	1269		
Long-tailed Duck	580	178	720	1196	606	294	110	112	415	77	107	245	201	16	377	113	110	59	191	329	109	415	107	191	58	120	117		
Common/Red-breasted Merganser	0	0	0	0	1	0	2	0	2	4	16	20	13	4	2	89	6	5	2	2	161	73	63	8	11	146	14		
Steller's/Common Eider	18	9	44	44	59	0	192	20	107	45	789	112	44	35	178	4	62	126	23	304	237	449	277	142	73	55	17		
Harlequin Duck	39	33	84	212	24	91	44	11	49	7	31	31	39	12	17	10	16	20	12	36	10	22	19	34	4	19	35		
Bufflehead	0	1	8	2	0	1	0	0	26	17	1	3	4	4	8	2	0	0	5	1	3	1	6	14	8	11	27		
Common/Barrow's Goldeneye	3	17	16	20	29	26	17	13	24	38	18	55	28	13	127	17	7	3	3	10	24	5	31	22	39	10	42		
Total CBC Sea Ducks	676	311	1773	1896	931	502	614	229	1033	488	1292	927	1045	483	1470	459	940	1411	476	1814	1854	2157	2481	1207	1106	1484	1574		
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total	Ann/Avr				
Greater/Lesser Scaup	101	3	293	90	1237	852	321	51	0	1	0	2046	15	0	326	28	380	143	155	294	2718	324	1109	13036	260.72				
Surf/White-winged/Black Scoter	1892	912	1429	885	640	1157	1646	1047	1062	153	536	1159	212	422	929	901	771	418	948	774	267	708	181	34100	682				
Long-tailed Duck	79	141	124	101	123	125	250	619	101	85	243	41	101	75	74	100	212	101	89	201	97	114	32	10381	207.62				
Common/Red-breasted Merganser	9	27	8	1143	64	40	45	46	16	16	14	31	5	12	7	263	103	66	24	265	33	18	9	2908	58.16				
Steller's/Common Eider	377	18	266	19	6	171	247	4	0	41	40		0	0	0	0	0	0	0	0	0	0	0	4654	93.08				
Harlequin Duck	52	3	13	40	30	17	44	37	46	90	32	42	15	28	39	7	23	18	17	17	25	27	10	1633	32.66				
Bufflehead	53	29	13	59	42	17	20	20	34	14	12	32	29	2	28	0	71	48	30	62	41	31	60	900	18				
Common/Barrow's Goldeneye	89	98	8	18	297	47	121	97	2	0	85	68	113	70	83	44	820	41	29	92	76	232	65	3252	65.04				
Total CBC Sea Ducks	2652	1231	2154	2355	2439	2426	2694	1921	1261	400	962	3419	389	609	1486	1343	2380	835	1292	1705	3257	1454	1466	70763	1415.26				

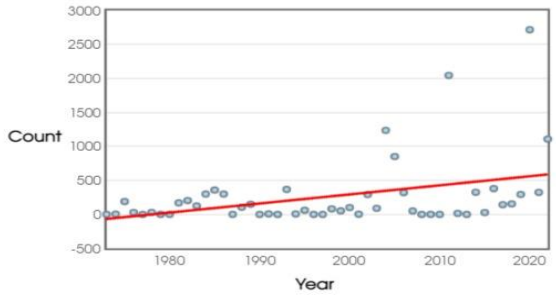
Appendix C

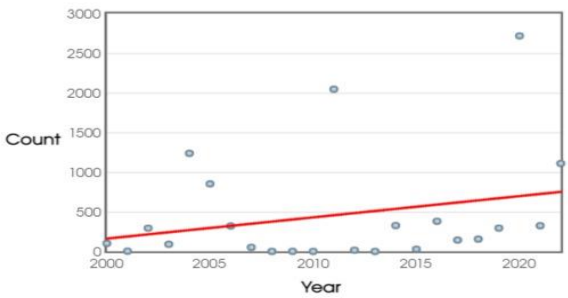

Homer Christmas Bird Counts for Fifty Years
Greater/Lesser Scaup
Surf/White-winged/Black Scoter
Long-tailed Duck
Common/Red-breasted Merganser
3,000
2,500
2,000
1,500
1,000
500
-
1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022

Simple Linear Regression Charts by Species/Taxa

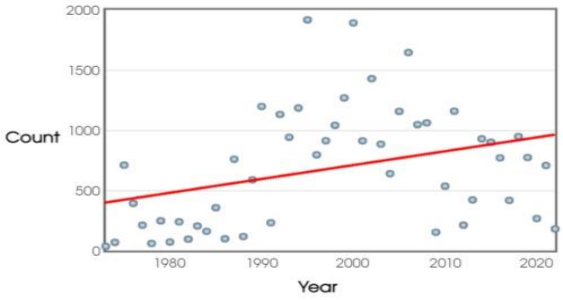
50 Years **22 Years**

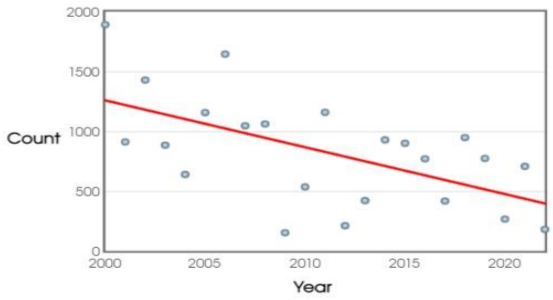
Scaup (Greater & Lesser)



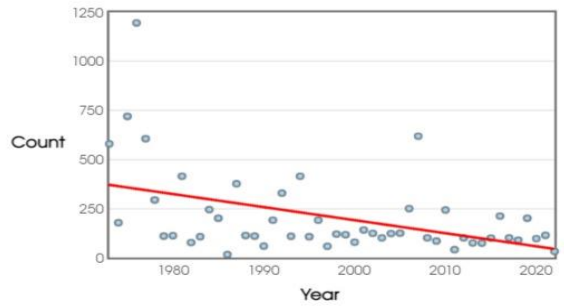


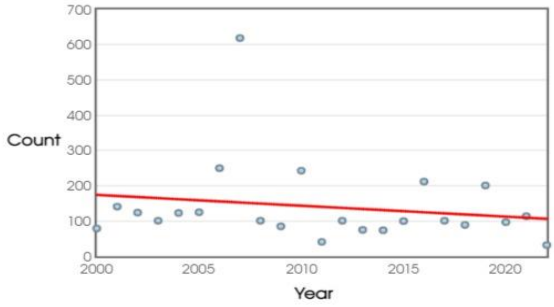
Scoter (Surf, White-winged, & Black)





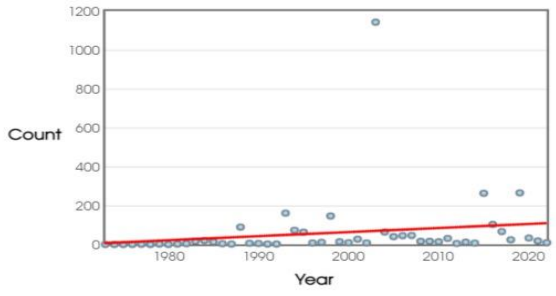
Long-tailed Duck

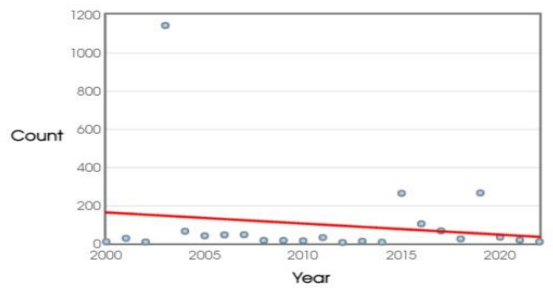




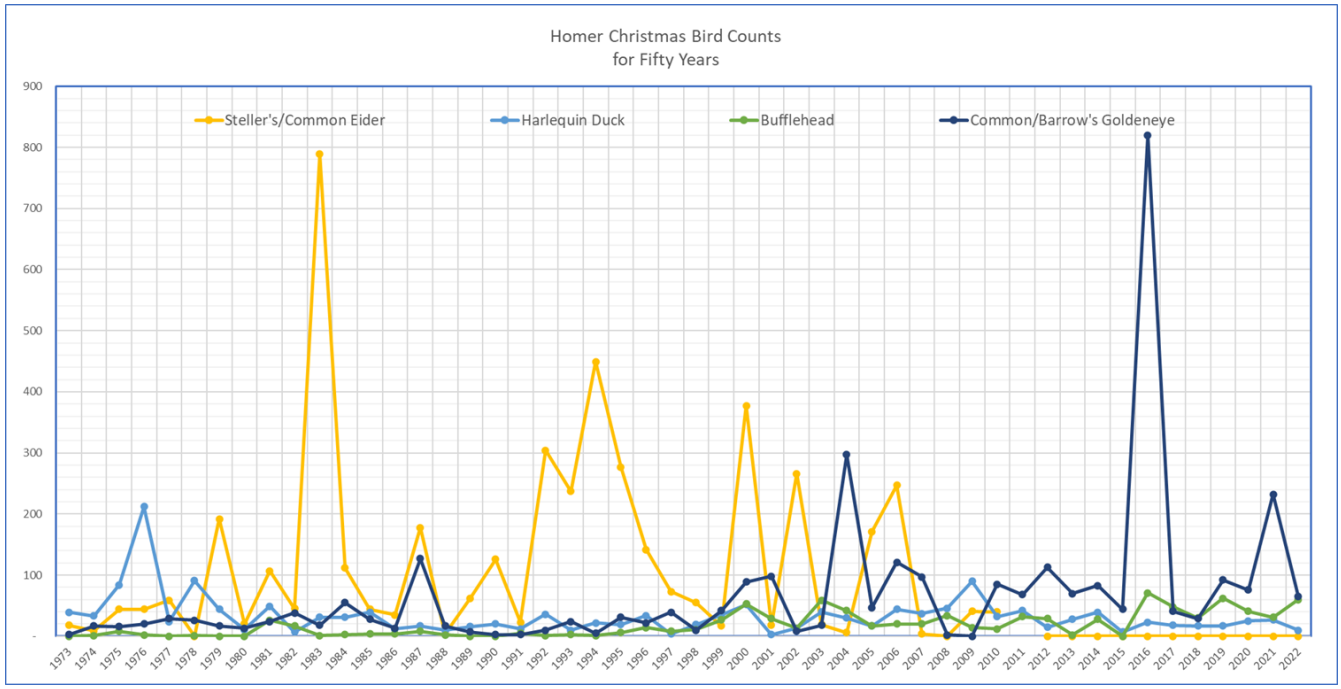
Note: The loss of the fish processing plant from fire in the Homer Harbor in 1998 has probably had an affect on the Long-tailed Duck population that overwinter in Kachemak Bay. The fish waste in th outfall near the entrance to the harborattracted many ducks, including Long-tail Ducks.

Merganser (Common & Red-breatsed)





Appendix D


Homer Christmas Bird Counts
for Fifty Years
Steller's/Common Eider
Harlequin Duck
Bufflehead
Common/Barrow's Goldeneye
900
800
700
600
500
400
300
200
100
-
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
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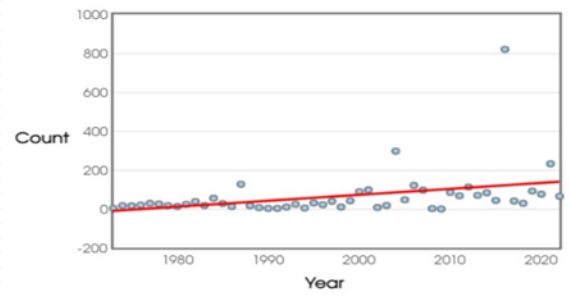
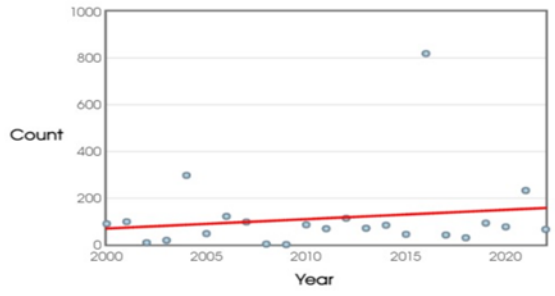
2014
2015
2016
2017
2018
2019
2020
2021
2022

Simple Linear Regression Charts by Species/Taxa

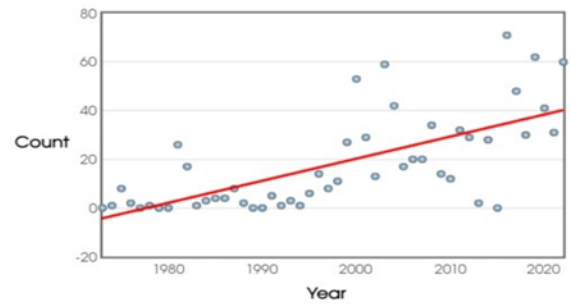
50 Years | **22 Years**

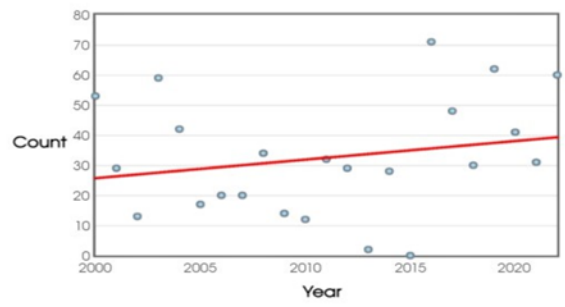
Goldeneye (Common & Barrow's)



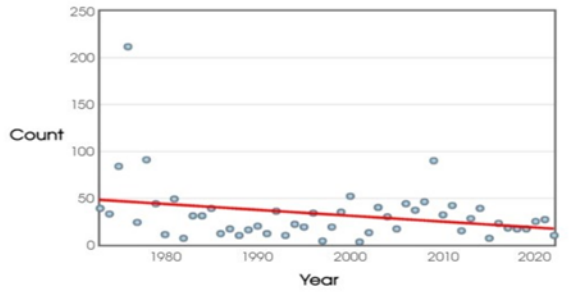


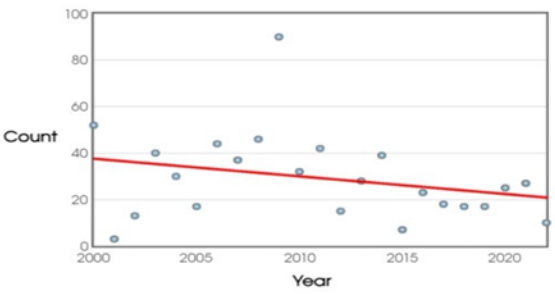
Bufflehead





Harlequen Duck





Eider's (Steller's & Common)