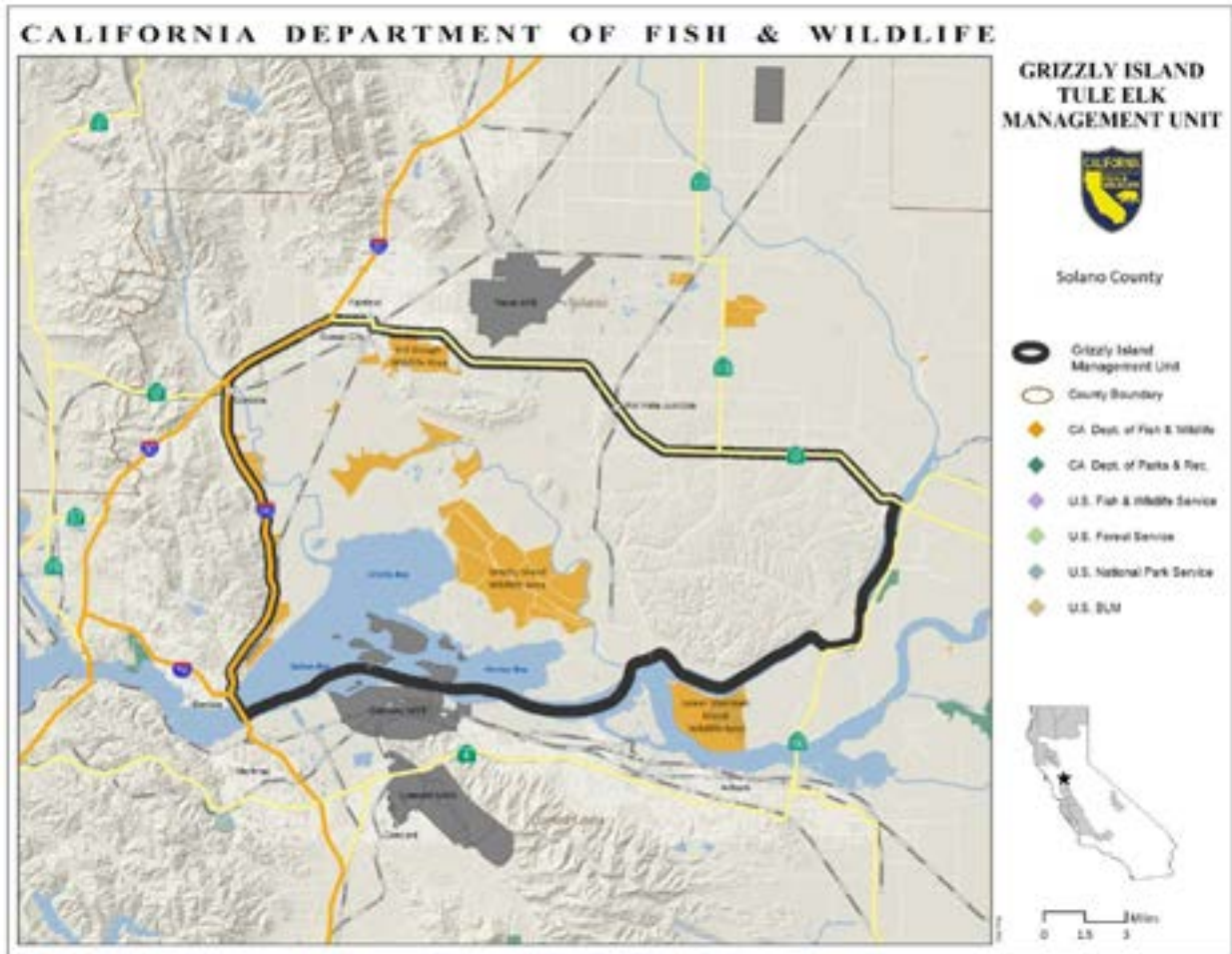


Grizzly Island Tule Elk Management Unit



Grizzly Island Tule Elk Management Unit

Description

The Grizzly Island Tule Elk Management Unit (Unit) in Solano County is about 7 miles southeast of Fairfield, immediately north and east of the Suisun Bay. Topography is flat; elevation varies from 3 feet below to 6 feet above sea level. The Unit is within the Bay Area and Central Coast Province, as identified in the California State Wildlife Action Plan (California Department of Fish and Wildlife 2015). Grizzly Island is within historical tule elk range as depicted by McCullough (1969).

Tule elk (*Cervus canadensis nannodes*) inhabit Grizzly Island Wildlife Area and adjacent private wetlands, grasslands, and uplands managed as waterfowl clubs. Grizzly Island Wildlife Area consists of 8,600 acres of estuarine marsh and associated uplands. It is part of an 18,000 acre complex managed by the California Department of Fish and Wildlife (Department) in the heart of the Suisun Marsh, the largest estuarine marsh on the west coast. Grizzly Island is managed primarily as seasonal wetlands and associated uplands. Levees, water control structures, and pumps have been installed and maintained to manage seasonal flooding of the ponds. Common wetland plants include: saltgrass (*Distichlis spicata*), pickleweed (*Salicornia virginica*), tules (*Scirpus* spp.), cattails (*Typha* spp.), Baltic rush (*Juncus balticus*), and fat hen (*Atriplex triangularis*). Seasonal wetlands and transitional grasslands contain dense vegetation over six feet high in some areas. Common grassland plants include: bromes (*Bromus* spp.), wild oats (*Avena* spp.), fescues (*Festuca* spp.), ryes (*Lolium* spp.), tall wheatgrass (*Elytrigia* spp.), and mustards (*Brassica* spp.). Woody vegetation consists of scattered stands of coyote brush (*Baccharis pilularis consanguinea*) and eucalyptus (*Eucalyptus* spp.) trees.

Located near San Francisco's urban center, Grizzly Island is used extensively by the public. Popular recreational activities include waterfowl, pheasant, rabbit, and elk hunting, fishing, bird watching, photography, nature viewing, dog training, and hiking. General public use (bird watching, nature viewing, photography, hiking, etc.) is allowed from February through July, and at the end of September for approximately two weeks prior to waterfowl season. Dogs are prohibited from March through June during bird nesting. Grizzly Island is open to the public from sunrise to sunset, except during waterfowl and elk seasons when access is allowed before sunrise and after sunset. Specific regulations for Grizzly Island Wildlife Area are listed in Title 14, California Code of Regulations (14 CCR §550 and 551).

Ensuring compliance with area regulations continues to be challenging. Pedestrian access is allowed to most of Grizzly Island; however, some individuals illegally enter closed areas or drive on levees and roads that are closed to vehicles. Excessive vehicular speed is an ongoing concern on Grizzly Island Road (a gravel road maintained by Solano County), where numerous accidents have occurred, some

involving human fatalities.

Elk Distribution and Abundance

The Department translocated four bulls and three cows to Grizzly Island from Tupman Tule Elk State Reserve (Kern County) in February 1977, and a yearling cow from the Owens Valley was released later that year. One bull, one cow, and one calf were brought to augment the population during 1978 and 1979. The herd grew rapidly from this nucleus and by December 1985, it exceeded 100 animals. Initially, when the herd exceeded 100 animals, the Department captured and moved surplus elk to suitable reintroduction sites.

The initial population objective in the 1988 Grizzly Island management plan (California Department of Fish and Game 1988) was 50-70 elk. Selection of the population objective level was influenced by events from November 1985 through January 1986, when at least 15 elk died from ingesting poison hemlock (*Conium maculatum*), a common plant on levees and roads in the Suisun Marsh. The elk population exceeded 100 animals during that period and it was thought that high population size contributed to the mortalities. The management plan was revised in 1992 (California Department of Fish and Game 1992), with slight increases to the population objective, the desired bull ratio, and the minimum calf recruitment rate. Isolated mortalities have occurred since 1992 (Table 1); however, significant mortalities from poison hemlock have not been detected. The population for this Unit is estimated to be approximately 300 elk.

There are no predators of elk in the Unit (coyotes may scavenge carcasses, but have not been observed taking elk calves). Department staff, who live on site, conduct ground counts to monitor elk population numbers and determine sex and age ratios (Table 1). Additionally, the area is used intensively by the public. Thus, non-hunting elk mortalities are seldom undetected and appear to have had minimal impact on the Grizzly Island elk population.

Management Goals, Objectives, and Actions

The management goals for this Unit are to 1) In consideration of current habitat capacity, other land uses, and long term environmental changes, improve elk habitat conditions and population levels; and 2) enhance opportunities for the public to use and enjoy elk (e.g. hunting and wildlife viewing). Specific objectives and actions for each goal are listed below. Department regional and headquarters staff will perform the identified actions.

Goal 1. In consideration of current habitat capacity, other land uses, and long term environmental changes, improve elk habitat conditions and population levels.

The elk population is increasing and has exceeded the upper population target identified in Objective 1.4. Collecting elk population and habitat data will allow the Department to track trends through time and measure the success of enhancing elk and elk habitat.

Population management for this Unit involves efforts to stabilize elk numbers in consideration of existing habitat conditions. Continued population expansion will result in distribution of elk into areas with high levels of conflict and roadway safety issues. Population management will involve a liberal level of regulated elk hunting. Recruitment is consistently high and non-hunting mortality low for the Grizzly Island population (Table 1). Initially, surplus animals were captured and moved to control population size. However, the need for surplus animals has diminished and regulated hunting is the primary strategy to manage population numbers. Under this strategy, annual tag quotas are recommended to achieve/maintain the population management objectives specified for the Unit. Observed parameters (e.g., total population numbers, age and sex compositions) are evaluated in light of population management objectives to develop specific quota recommendations, while considering expected calf production, hunter success from prior years, and non-hunting mortality factors.

Enhancing elk habitat is critical to maintaining healthy elk populations within this Unit. Natural disturbance promotes a mix of habitat types and successional stages that benefit elk. To achieve these objectives, the Department will collaborate with the Suisun Resource Conservation District (SRCD) and private landowners.

Objective 1.1. Continue projects to determine population abundance, distribution, habitat use, and demographics to provide managers with additional information to make adaptive management decisions.

Action 1.1.1

Continue to collect population, distribution, and composition data in an effort to inform management decisions that would benefit elk. **Ongoing.**

Action 1.1.2

Continue to collect physical measurements and whole weights of harvested elk, along with tooth samples and body condition evaluations. **Ongoing.**

Action 1.1.3

Develop innovative technologies to determine population parameters such as fecal DNA and unmanned aerial vehicle surveys. **Expected completion: 2023.**

Objective 1.2. Enhance or increase elk habitats by at least 5% by 2028.

Action 1.2.1

Map current elk habitat to detect change over time to guide management decisions. **Expected completion: 2021.**

Action 1.2.2

Meet annually with SRCD, non-governmental organizations (NGOs), and private landowners to identify opportunities to conserve and enhance elk habitats. **Ongoing.**

Action 1.2.3

Participate in landscape level planning efforts, to the extent possible, to identify potential impacts and make recommendations that would benefit elk and elk habitats. **Ongoing.**

Action 1.2.4

Within Grizzly Island Wildlife Area boundaries, continue planting, disking and mowing within seasonal pond areas to stimulate plant growth. **Ongoing.**

Action 1.2.5

Within Grizzly Island Wildlife Area boundaries, continue planting cultivated grains to improve upland fields for elk. **Ongoing.**

Action 1.2.6

Within Grizzly Island Wildlife Area boundaries, continue efforts to eradicate noxious weeds and undesirable invasive plants such as *Lepidium*, *Phragmites*, and yellow star-thistle (*Centaurea solstitialis*). **Ongoing.**

Action 1.2.7

Evaluate the feasibility of establishing additional elk rubbing posts to reduce damage to telephone and power line poles and wildlife area signs. **Expected completion: 2019.**

Objective 1.3. Determine genetic diversity of the population by 2023.

Action 1.3.1

Distribute DNA collection kits to elk hunters for submittal of DNA samples. **Ongoing.**

Action 1.3.2

Continue to opportunistically translocate individual elk or small groups to Grizzly Island to optimize genetic diversity. **Ongoing.**

Objective 1.4. Maintain a population of 150-250 elk with a minimum ratio of 50 bulls per 100 cows (80% bulls shall be branch antlered).

Action 1.4.1

Provide bull and antlerless hunting opportunities at levels that allow for a robust population level while not impacting existing habitat conditions. **Ongoing.**

Action 1.4.2

Maintain a minimum calf recruitment rate of 40%. **Ongoing.**

Action 1.4.3

Review monitoring, management, and research data on an annual basis and adjust population objectives as appropriate. **Ongoing.**

Goal 2. Enhance opportunities for the public to use and enjoy elk (e.g. hunting and wildlife viewing).

The Department will continue to work with conservation partners to inform the public about elk and elk management within the Unit, and promote various recreational opportunities such as hunting, wildlife viewing, photography and nature study. Management actions are currently needed for the increasing elk population that is above the population objective.

The Department has identified regulated hunting as the primary tool to both manage elk populations and provide public recreation opportunities. Through regulations, hunting can influence elk distribution and population parameters. Timing and duration of hunt periods, hunt boundaries, tag designations (i.e., bull, antlerless or either-sex tags), quotas, and method of take (e.g., general methods, archery only, muzzleloader only) can affect hunter success, elk population numbers, and age/sex compositions within the Unit. The quality and quantity of elk demographic data and desires for hunter opportunity are other considerations in recommending and/or adopting elk hunting regulations. Each year, the Department considers modifications to hunt zone boundaries, tag quotas, hunt periods, and methods of take.

The Department is evaluating the feasibility of expanding existing hunt boundaries to include property adjacent to Grizzly Island Wildlife Area. This would provide flexibility to harvest individuals from subgroups that may not utilize the Wildlife Area during the hunt periods. Subgroups that are not susceptible to population control could potentially lead to an increase in numbers and distribution outside of the Unit goals. Expanding the boundaries could also open up opportunities for landowners to enroll in the Department's Shared Habitat Alliance for Recreational Enhancement (SHARE) program. Under this program, participating landowners receive compensation and liability protection in exchange for allowing access to or through their land for public recreational use and enjoyment of wildlife. The SHARE program receives funding from application fees for access permits. SHARE may also assist in controlling elk population numbers and managing damage/land use conflicts that involve elk on private land.

Objective 2.1. Increase elk hunting opportunities by at least 10% by 2021, where feasible and compatible with population objectives.

Action 2.1.1

Complete a new elk hunting environmental document that will analyze additional hunting opportunities. **Expected completion: 2020.**

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Action 2.1.2

Evaluate the feasibility of expanding the hunting zone boundaries.

Expected completion: 2019.

Action 2.1.3

Utilize SHARE to increase elk hunting opportunities and maintain elk populations within objectives. Ongoing.

Objective 2.2. Install/update one elk interpretive sign by 2024.

Action 2.2.1

Coordinate with the SRCD for adding and/or updating an elk interpretive sign. Expected completion: 2022.

Objective 2.3. Provide information on the Department web page to inform the public about elk and elk viewing opportunities by 2020.

Action 2.3.1

Work with agencies and NGOs to provide information on elk and elk viewing. Expected completion: 2020.

Herd Viability

Tule elk have been reestablished at Grizzly Island for more than 35 years. Based on all monitoring, the elk are in excellent physical condition. Bull to cow ratios and recruitment rates are consistently high (Table 1). Sufficient adult bulls are being retained for breeding and public viewing; and the relatively young age of cow elk suggests population vigor and the potential for continued high reproduction. Consistently high body weights are indicative of high quality habitat and stable habitat conditions.

Grizzly Island provides excellent tule elk habitat. Population size has not been limited by habitat quality/quantity; instead, population numbers are controlled with harvests that periodically meet or exceed calf production. In terms of overall viability, the Grizzly Island herd is one of the healthiest tule elk herds in the state. With additional habitat available nearby on private duck clubs and the frequent sightings by club members, it is apparent that suitable habitat exists outside the Wildlife Area. Herd numbers currently exceed 300 animals.

Because the Grizzly Island herd is not geographically connected to any other tule elk herd (and will likely never be), the Department has periodically translocated individual animals and small groups to Grizzly Island to optimize genetic diversity (Table 1). This occurred most recently in 2013, when one adult bull, one male calf and one female calf were moved from San Luis National Wildlife Refuge to Grizzly Island. Such actions should continue as opportunities arise.

Summary of Annual Harvests

The Fish and Game Commission (Commission) authorized annual tule elk hunts at Grizzly Island beginning in 1990. Public tags issued through the annual Big Game Drawing are in great demand. Annual tag quotas and harvests for Grizzly Island are listed in Table 2. Reported take of antlerless elk within the Unit is relatively high. This Unit has high recruitment and low non-hunting mortality and the take of female elk in sufficient numbers is essential if a primary objective of regulated hunting is to control population size.

Annual harvests are shown in Figure 1. Public hunting accounted for the vast majority of the reported harvest with only a small harvest under the Private Lands Management (PLM) program from 2006-2008, when the Commission approved tule elk hunting for the Pintail Ranch. The Pintail Ranch has since withdrawn from the PLM program. Other landowners have not joined and the PLM harvest is expected to remain comparatively small.

Tags currently are designated as antlerless, spike (yearling) bull, or bull (spike or branch antlered) tags. Designating specific quotas for antlerless and bull elk allows the harvest to be stratified by sex. For the bull harvest, some level of age stratification occurs across the yearling and adult (≥ 2 years) age classes through the designation of specific quotas for spike bulls and bulls. Hunting pressure and harvest of adult bulls can be reduced by reducing bull tag quotas, whereas recruitment of adult bulls can be increased (or suppressed) by reducing (or increasing) spike bull quotas. In 1992, an attempt was made to further stratify age of the bull harvest and facilitate take of two-year old bulls by establishing a four-point or less bull tag category. This effort was abandoned after two years when it was found that antlers of most two-year old bulls at Grizzly Island had at least five points per side.

Current tag categories and definitions are understood by the public and allow the Grizzly Island elk harvest to be stratified by sex and (for bulls) age classes. Take of calf elk (without spots) is allowed under the antlerless tag category definition (i.e., no antler longer than 4 inches), but the vast majority of antlerless tagholders selected female elk. Similarly, take of spike bulls is allowed under the bull tag category definition, but the vast majority of bull tagholders selected adult (i.e., branch antlered) bulls over yearling bulls. Public demand for adult bull tags is high, and more than 1,000 applications are submitted for each tag issued.

Quotas and harvests in Table 2 and Figure 1 include fund-raising tags issued pursuant to Fish and Game Code section 332 (FGC §332). Two Grizzly Island fund-raising tags per year were issued from 1990 through 2009; since then, one tag has been issued per year.

Harvests reported in Table 2 and Figure 1 include unintentional illegal take (e.g., tagholders that erroneously took two elk or that took spike bulls while possessing antlerless tags). Because unintentional illegal take was included as part of the total known harvest, on one occasion the harvest exceeded the tag quota for the spike bull

category (see Table 2; year 2000). Such incidents often were self-reported by violators, whose statements to Department officers indicated their actions were unintentional. Illegal take has occurred for other elk hunts in California and in other states. Hunt orientations are mandatory at Grizzly Island to reduce incidents of unintentional illegal take.

With excellent habitat conditions and high recruitment, total elk numbers can increase quickly under a conservative harvest. From 2009-2011, the population increased by more than 20% when the harvest was less than 10 elk per year (Table 1 and Figure 2). Conversely, a liberal harvest (which averaged 37 elk per year from 2001-2006) suppressed population growth and sharply reduced herd size by the end of 2006.

Monitoring activities associated with the Grizzly Island hunt program include the following:

- Requiring mandatory tag return/reporting;
- Collecting samples from harvested elk (e.g., teeth, blood, fecal, meat/tissue, antler, ectoparasite and other samples);
- Qualitative carcass descriptions of hunter harvested elk; and
- Physical measurements of harvested elk (e.g., whole body weight, chest girth, hind foot/hoof length).

Mandatory tag return/reporting allows annual harvests and hunter success rates to be determined with precision. Tooth samples provide age information and are suggestive of the age structure of the population. Qualitative carcass descriptions, whole body weights, and other physical description indices can be suggestive of the general health of the Grizzly Island elk herd.

Average ages of branch antlered (adult) bulls and antlerless elk by year from 1990 - 2015, based on analysis of cementum annuli in tooth samples from hunter-killed elk (performed by Matson's Laboratory, Milltown, MT), are identified in Figure 2. Mean age of adult bulls ranged from 3.3-9.0 years, whereas mean age of antlerless elk ranged from 0.5-6.2 years.

Sample sizes for adult bulls often were small (Figure 2), because of conservative tag quotas and harvests (Table 2). Management objectives require maintaining sufficient adult bulls for breeding and non-consumptive viewing; thus, age structure of the adult bull portion of the Grizzly Island population is an important monitoring indicator. A declining age trend would be of concern, particularly in combination with declines in either the number of adult bulls counted and/or hunter success. Figure 2 does not suggest a declining age trend in adult bulls. Consistently high adult bull sex ratios (Table 1) and hunter success rates (Table 2) indicate the Grizzly Island population contains sufficient branch antlered bulls.

Two factors likely contributed to the young age of antlerless elk compared to branched antlered bulls. First, the antlerless elk category includes yearling females (which cannot

be distinguished reliably from adult females in the field), spikes with both antlers less than 4 inches long, and male/female calves without spots (take of spotted calves is prohibited). Antlerless harvests for Grizzly Island included yearling females and male/female calves without spots. In contrast, the bull tag category definition (i.e., an elk with at least one antler longer than 4 inches) allows for the take of spike bulls; however, virtually all Grizzly Island bull tagholders selected branch antlered bulls over spikes (yearlings). Annual take of spikes is significant at Grizzly Island and a separate tag category exists (Table 2). However, yearling bulls seldom had branched antlers and thus were excluded for age analysis.

Second, the relatively young age of antlerless elk, particularly since 2006, likely resulted from intensive antlerless elk harvests that occurred from 2000-2006, which approached or exceeded calf production (Figure 2, Tables 1 and 2), and were as high as 25% of the population size. A prolonged intensive antlerless elk harvest should result in younger age class females, especially with high recruitment. Such intensive harvests were necessary to reduce population numbers to the management plan objective, and subsequently, to maintain that level.

Figure 3 contains mean whole body (i.e., ungutted) weights of adult bulls, spike bulls and antlerless elk (primarily adult and yearling females) taken at Grizzly Island from 1990-2016. Annual mean weights of adult bulls usually exceeded 700 pounds, which McCullough (1969) suggested was near the upper limit for tule elk. Mean weights of Grizzly Island antlerless elk are similar to the adjusted mean weight for Owens Valley antlerless elk (411 pounds; McCullough, 1969).

The Department also performs annual post-hunt population surveys to determine age and sex compositions and population size. Such surveys provide an indication of immediate results of the current year's harvest program.

In addition to the activities described above, others have monitored hunter-killed elk from Grizzly Island. VanBaren et al. (1996) reported on abomasal parasites. Crawford et al. (2006) evaluated Grizzly Island tule elk for evidence of paratuberculosis. Johnson et al. (2007) collected antler and liver samples from Grizzly Island elk for comparison to samples from the Owens Valley.

Unit Highlights

Tule elk have been reestablished at Grizzly Island for more than 35 years. The herd is very healthy based on habitat conditions and examination of individual animals. Because of its proximity to the San Francisco Bay, opportunities for public use and enjoyment of the elk are high. The herd has provided surplus animals to reestablish herds in suitable historical habitat. The current need for surplus animals has diminished and regulated hunting is now used to manage population numbers. The public hunting program is extremely popular. The Department has monitored elk within the Unit and collaborated with land management agencies and NGOs to implement research and management activities. Below is a partial listing of these activities:

- California Department of Fish and Game. 1989. Grizzly Island wildlife area management plan. Unpublished report, California Department of Fish and Game, Sacramento, California, USA.
- California Department of Fish and Game. 1992. Grizzly Island tule elk management unit management plan. Unpublished report, California Department of Fish and Game, Sacramento, California, USA.
- Fowler, G.S. 1985. Tule elk in California – history, current status and management recommendations. California Department of Fish and Game. Interagency Agreement. #C-698. Sacramento, California, USA.

The Department has collaborated with universities, NGOs, and other agencies to develop monitoring and management activities within the Unit. A partial listing of these and other studies submitted to the Department includes the following:

Unit Specific Research

Crawford, G.C., M.H. Ziccardi, B.J. Gonzales, L.M. Woods, J.K. Fischer, E.J.B. Manning, and J.A.K. Mazet. 2006. *Mycobacterium avium* subspecies *paratuberculosis* and *Mycobacterium avium* subsp. *avium* infections in a tule elk (*Cervus elaphus nannodes*) Herd. *Journal of Wildlife Diseases* 42:715-723.

Johnson, H.E., V.C. Bleich, and P.R. Krausman. 2007. Mineral deficiencies in tule elk, Owens Valley, California. *Journal of Wildlife Diseases* 43:61-74.

Van Baren, D.C., E.P. Hoberg, and R.G. Botzler. 1996. Abomasal parasites in tule elk (*Cervus elaphus nannodes*) from Grizzly Island, California. *Journal of the Helminthological Society of Washington* 63:222-225.

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14 CCR §551.

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California Department of Fish and Wildlife. 2015. California state wildlife action plan, 2015: a conservation legacy for Californians. Edited by Armand G. Gonzales and Junko Hoshi, Ph.D. Prepared with assistance from Ascent Environmental, Inc., Sacramento, California, USA.

Crawford, G.C., M.H. Ziccardi, B.J. Gonzales, L.M. Woods, J.K. Fischer, E.J.B. Manning, and J.A.K. Mazet. 2006. *Mycobacterium avium* subspecies *paratuberculosis* and *Mycobacterium avium* subsp. *avium* infections in a tule elk (*Cervus elaphus nannodes*) Herd. *Journal of Wildlife Diseases* 42:715-723.

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Johnson, H.E., V.C. Bleich, and P.R. Krausman. 2007. Mineral deficiencies in tule elk, Owens Valley, California. *Journal of Wildlife Diseases* 43:61-74.

McCullough, D.R. 1969. The tule elk, its history, behavior, and ecology. University of California Publication in Zoology 88. University California Press, Berkeley, USA.

Van Baren, D.C., E.P. Hoberg, and R.G. Botzler. 1996. Abomasal parasites in tule elk (*Cervus elaphus nannodes*) from Grizzly Island, California. *Journal of the Helminthological Society of Washington* 63:222-225.

Data Tables/Figure

Table 1. Tule Elk Herd History Grizzly Island Wildlife Area, 1977-2016.

Year	Adult		Yearling		Calves	Non-hunt Mortalities			Harvest/Removed			Moved In			Total
	M	M	F	F		M	F	C	M	F	C	M	F	C	
1977	4	0	3	1	3	0	0	0	0	0	0	0	0	0	11
1978	3	0	5	3	6	0	0	1	1	0	0	0	1	1	17
1979	3	2	8	4	7	1	0	1	0	0	0	1	0	0	25
1980	5	3	12	4	11	0	0	0	0	0	0	0	0	0	35
1981	7	6	16	5	13	1	0	3	0	0	0	0	0	0	47
1982	11	5	20	8	14	2	1	1	0	0	2	0	0	0	58
1983	15	4	27	10	16	1	1	1	0	0	3	0	0	0	72
1984	12	8	36	8	24	2	1	0	6	0	0	0	0	0	88
1985	17	12	42	12	24	3	2	9	0	0	0	0	0	0	107
1986	13	12	25	12	10	1	0	0	15	29	33	0	0	0	72
1987	23	5	38	5	28	2	0	0	0	0	0	0	1	0	99
1988	19	9	22	19	24	2	0	0	7	21	12	0	0	0	95
1989	28	10	41	14	35	0	0	0	0	0	0	0	0	0	128
1990	26	15	32	18	24	4	1	0	10	22	9	0	0	0	114
1991	38*	1	23	12	27	11	1	0	15	25	10	0	0	0	107
1992	25	5	15	10	33	2	0	0	20	30	2	0	0	0	89
1993	25	5	13	16	23	3	1	0	16	11	1	0	0	0	80
1994	22	7	20	10	20	1	1	1	11	7	1	0	0	0	79
1995	25	9	23	11	22	3	2	2	10	5	1	3	0	0	87
1996	22	7	25	10	21	2	0	1	9	9	0	0	0	0	85
1997	20	4	28	9	31	4	1	0	10	9	0	0	0	0	92
1998	25	6	31	17	32	0	2	3	10	9	0	5**	3	0	110
1999	23	13	45	11	34	1	1	1	10	13	2	0	0	0	126
2000	28*	5	36	20	32	3	0	3	13	20	4	0	0	0	121
2001	26*	10	39	13	35	5	0	1	12	24	1	0	0	0	123
2002	31	6	27	21	39	1	1	0	12	22	2	0	0	0	124
2003	33	8	21	23	41	0	0	0	12	27	0	0	0	0	126
2004	36	10	25	17	32	1	1	0	12	24	2	0	0	0	121
2005	40	15	19	17	29	1	0	0	12	23	4	3	0	0	118
2006	17	6	13	7	12				8	23	2	7	0	0	57
2007	21	6	26	6	13	0	0	1	4	4	2	0	3	10	78
2008	28	8	33	7	16	2	0	0	3	5					92
2009***	28	8	35	8	16	5	0	0	3	5					95
2010***	29	8	46	7	17	1	0	0	2	4					107
2011	28	13	50	10***	17	1	0	0	2	5					118
2012	64	14	77	0	31	3	1	0	7	2	0				186
2013	64	14	61	0	27	0	0	0	7	7	1	1		2	166
2014	58	12	144	0	68	0	0	0	19	28	2				282
2015	58	23	175	0	76	1	0	0	19	37	2				332
2016	17	20	65	1	7	0	0	0	23	54	3				110

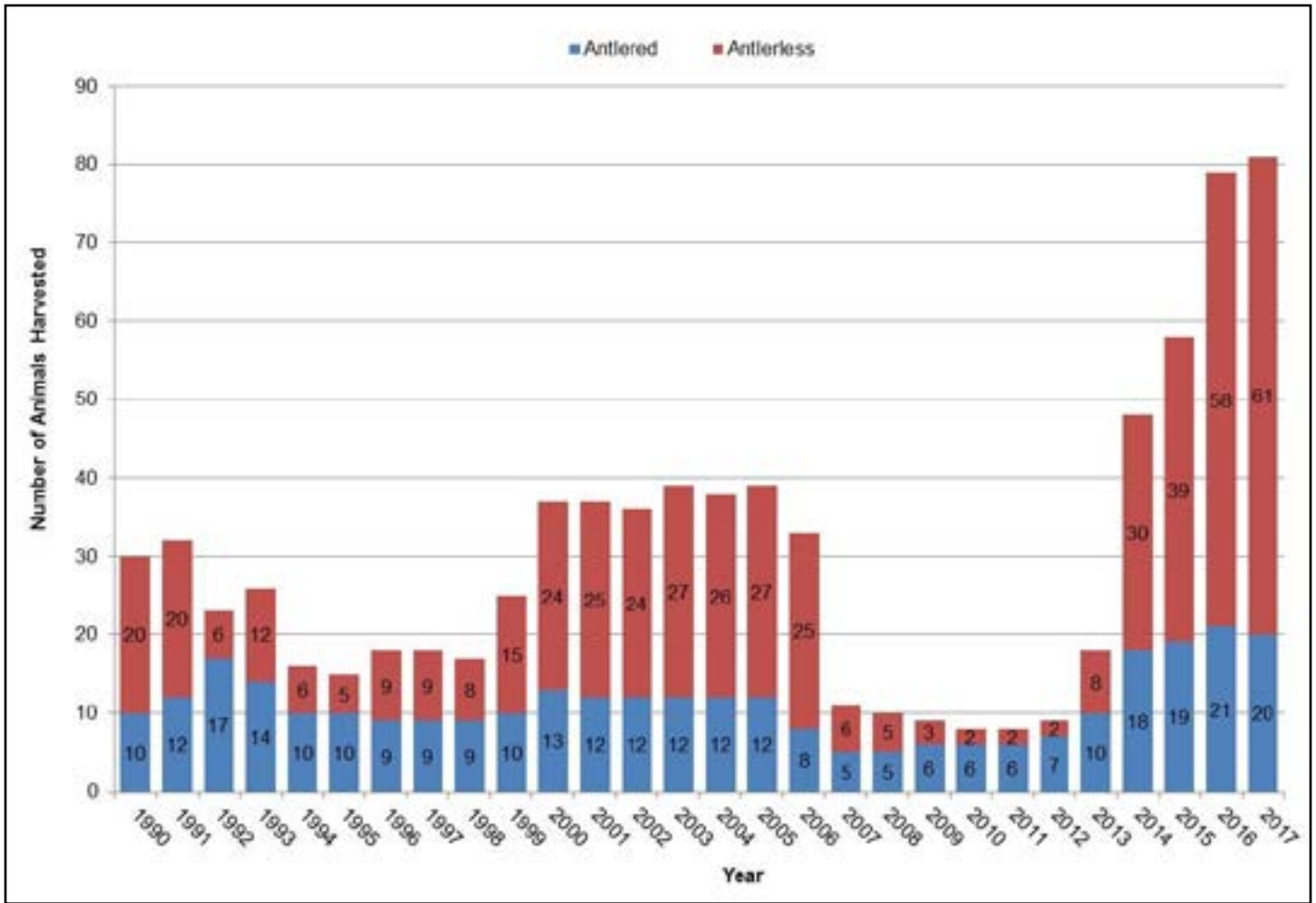
* Based on observation

** Does not include bull on Sherman Island

***Population Estimates, no survey data available

Table 2. Grizzly Island Tule Elk Hunt, Public Tag Quotas and Harvests, 1990-2017.

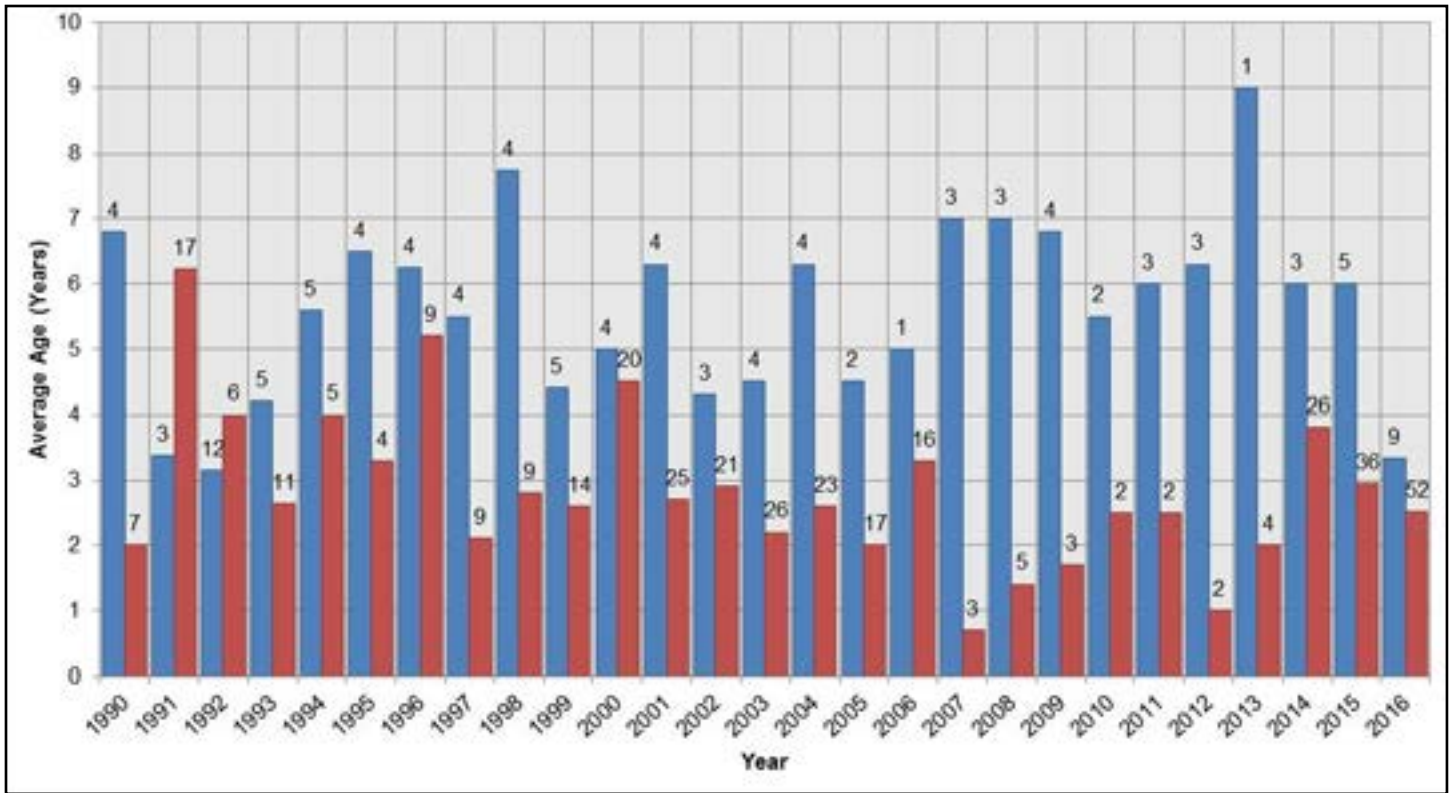
Year	Bull		Antlerless		Four Point or Less Bull		Spike Bull		Apprentice Spike Bull		Apprentice Antlerless	
	Tags Issued	Harvest	Tags Issued	Harvest	Tags Issued	Harvest	Tags Issued	Harvest	Tags Issued	Harvest	Tags Issued	Harvest
1990	10	10	20	20								
1991	4	4	20	20	9	8						
1992	11	11	6	6	6	6						
1993	5	5	12	12			9	9				
1994*	5	5	9	6			6	5				
1995	4	4	6	5			6	6				
1996	4	4	9	9			6	5				
1997	4	4	9	9			6	5				
1998	4	4	9	8			6	5				
1999	5	5	16	15			6	5				
2000**	4	4	25	24			8	8				
2001	4	4	25	25			8	8				
2002	4	4	25	24			8	8				
2003	4	4	28	27			8	8				
2004	4	4	28	26			8	8				
2005	4	4	28	27			8	8				
2006	4	3	27	24			6	5	2	2	1	1
2007	4	4	5	5					1	1	1	1
2008	4	4	5	5					1	1		
2009	4	4	4	3			1	1	1	1		
2010	3	3	2	2			2	2	1	1		
2011	3	3	2	2			2	2	1	1		
2012	3	3	2	2			3	3	1	1		
2013	5	5	8	8			3	3	2	2		
2014	5	5	28	28			11	11	2	2	2	2
2015	5	5	36	36			11	11	3	3	3	3
2016	5	5	56	54			12	11	4	4	4	4
2017	6	5	58	55			11	11	4	4	6	6
Totals	131	129	508	487	15	14	155	148	23	23	17	17
Success Rate	98%		96%		96%				100%			



■ Bull
■ Antlerless

Average age depicted if N>1, and individual age if N=1.

Figure 1. Tule Elk Harvest within the Grizzly Island Management Unit, 1990-2017. Sample sizes are denoted above bars for each year.



■ Bull
■ Antlerless

Average age depicted if N>1, and individual age if N=1.

Figure 2. Average Age of Harvested Elk within the Grizzly Island Management Unit, 1990-2016. Sample sizes are denoted above bars for each year.

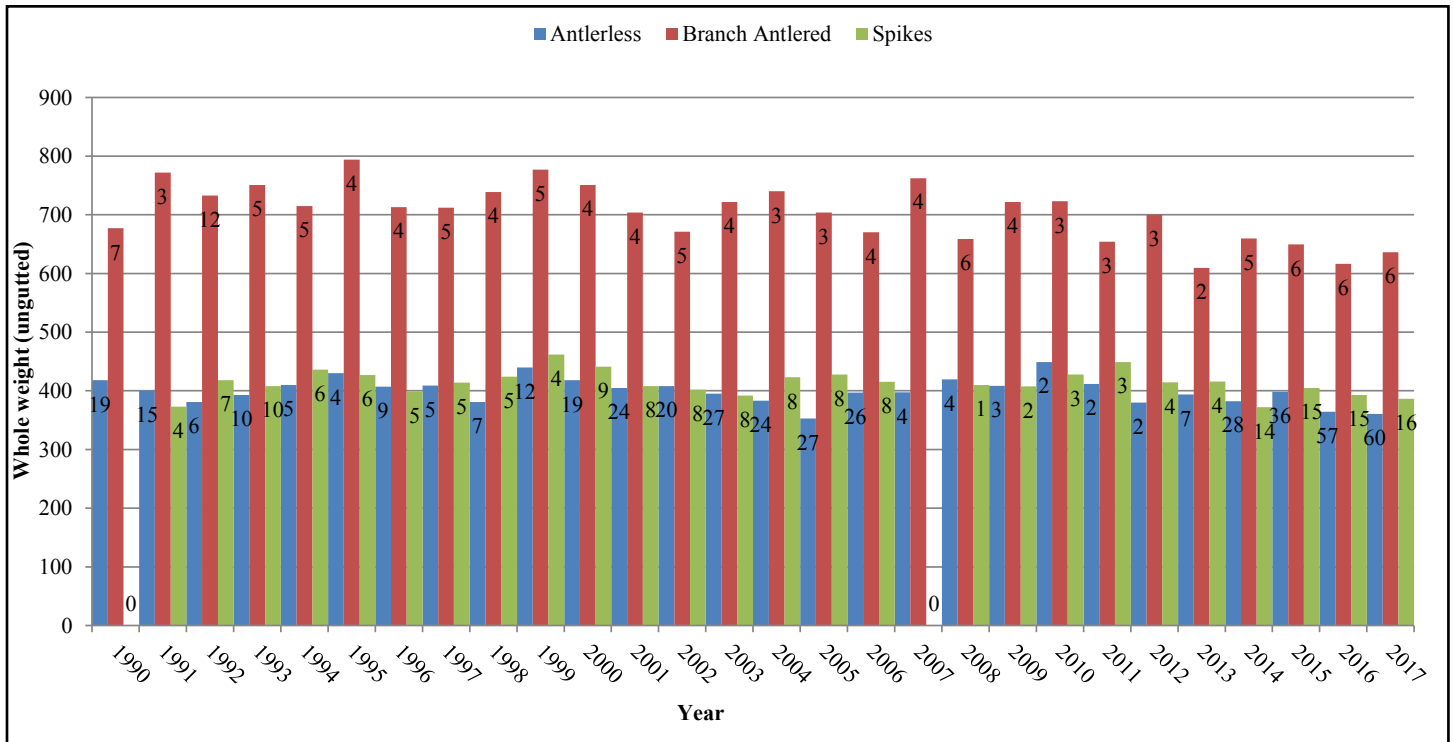


Figure 3. Average Weight (in pounds) of Hunter Harvested Tule Elk within the Grizzly Island Management Unit, 1990 - 2017. Sample sizes are denoted above bars for each year.