

State of California
THE RESOURCES AGENCY
Department of Fish and Game

78.02
Belluomini '78

ASSESSMENT OF MUSKRAT CAUSED DAMAGE IN CALIFORNIA^{1/}

by

Linda Belluomini

July 1978

ABSTRACT

Six hundred and forty questionnaires were mailed to water service agencies throughout California to determine the geographical and fiscal impact of muskrat damage, and the type and effectiveness of muskrat control measures currently in use. Reported muskrat damage occurs in 28 of California's 58 counties with a minimum annual loss of \$1,000,000 reported. The leg-hold trap is the most common and effective control measure employed and is responsible for the take of 22,500 muskrats annually.

^{1/} Supported by Federal Aid in Wildlife Restoration, Project W-54-R-10, Wildlife Management Branch, Nongame Wildlife Investigations, Job II-1.0, Progress Report (July 1978).

INTRODUCTION

The highly aquatic muskrat (*Ondatra zibethicus*) is native to the inland freshwater marshes and rivers of California's Great Basin region and along the Colorado River (Grinnell et al. 1937). The muskrat has expanded its range in California over the last 100 years as a result of fur ranching muskrats and plants (Seymour 1954). Escapees from fur ranching operations in the Sacramento River drainage found habitat in natural marshes and in the increasing number of irrigation canals and drains in California's Central Valley. The extensive irrigation systems have provided a vehicle by which muskrats could colonize new areas and a substantial amount of year-round habitat as well as vast amounts of seasonal habitat (Seymour 1954).

The agriculture which was so beneficial to the muskrat did not reap mutual benefits from the muskrat. The muskrat is an agricultural pest, causing damage to water control structures and secondarily to crops. The present extent of the muskrat's range and the extent of its damage is little documented.

Since economics do not usually allow agricultural pests to go unchecked, many farmers and irrigation water suppliers try to control their losses, and thus try to control muskrat populations to some extent. Trapping was believed to be the major control method prior to this study because trapping muskrats for fur has been a common practice. Recent considerations by the State Legislature to prohibit the use of the leg-hold and other traps further emphasizes the need to look at muskrats, their effects on agriculture and agricultural interests' efforts to control muskrat numbers. In the spring of 1978, a questionnaire survey was made of water districts in the state to document muskrat distribution, damage and control measures, and study of the population dynamics of muskrat populations was initiated. This report discusses the results of the survey questionnaire.

METHODS

Questionnaires were mailed in April, 1978 to 640 water districts in counties throughout California. These questionnaires (Appendix 1) were designed to provide information on: muskrat distribution, presence and extent of damage caused by muskrats, muskrat control measures used, and effects of these control measures.

RESULTS

Distribution

Three hundred and thirty-five usable questionnaires were returned by July, 1978 providing information from 53 of California's 58 counties. Muskrats are reported to occur in 40 of the 53 responding counties; 28 of these claim to sustain damage from muskrats (Table 1).

* * *

Table 1. Muskrat distribution reported by county on the muskrat damage questionnaire, 1978.

<u>Counties Reporting Depredating Muskrats</u>	<u>Counties Reporting Nondepredating Muskrats</u>	<u>Counties Reporting An Absence of Muskrats</u>
1. Butte	1. Alameda	1. Los Angeles
2. Colusa	2. Calaveras	2. Mono
3. Contra Costa	3. Del Norte	3. Orange
4. El Dorado	4. Humboldt	4. Placer
5. Fresno	5. Kern	5. San Benito
6. Glenn	6. Lassen	6. San Bernardino
7. Imperial	7. Marin	7. San Francisco
8. Kings	8. Mendocino	8. San Luis Obispo
9. Lake	9. Napa	9. San Mateo
10. Madera	10. Plumas	10. Santa Clara
11. Merced	11. San Diego	11. Sierra
12. Modoc	12. Tehama	12. Tuolumne
13. Monterey		13. Ventura
14. Nevada		
15. Riverside		
16. Sacramento		
17. San Joaquin		
18. Santa Barbara		
19. Santa Cruz		
20. Shasta		
21. Siskiyou		
22. Solano		
23. Sonoma		
24. Stanislaus		
25. Sutter		
26. Tulare		
27. Yolo		
28. Yuba		

Damage

The majority of counties reporting muskrat caused damage are located in the Central Valley (Figure 1). This would be expected considering the history of muskrat colonization in California.

Water service agencies estimated muskrat caused damage at approximately \$1,000,000 annually (Table 2). This is considered a conservative estimate as only 53% of the respondents reporting damage were able to report costs incurred from levee or control gate repairs, or the losses from damage to crops through flooding caused by muskrats or consumption by muskrats. Additionally, some water districts reported muskrat caused damage but were not able to estimate the fiscal impact.

* * *

Table 2. Types of muskrat caused damage and estimated costs as reported by water service agencies.

<u>Damage Type</u>	<u>Estimated Cost</u>	<u>Reported Occurrence of Damage Type</u>	<u>% of Agencies Reporting Damage</u>
Burrowing in levees	\$330,000	116	48.7
Gnawing control gates	70,000	47	19.7
Crop depredation	350,000	42	17.6
Miscellaneous	250,000	33	13.9
-burrowing in ditches			
-burrowing in orchard floor			
-plugging drain pipes			
TOTAL DAMAGE	\$1,000,000		

* * *

Damage to levees is reported to be twice as common as damage to control gates or crop depredation; however, water service agencies report a higher monetary loss due to crop depredation. Other damage includes a variety of items such as burrowing in ditch banks which leads to the flooding of crops.

Control

The reported control of damage causing muskrats is equally delegated to personnel within the ranks of the water service agencies, and to private trappers. One agency reports using a government trapper.

More than half of the water districts indicate that they allow or otherwise control licensed fur trappers during the winter season. The harvesting of muskrats when their pelts are prime works to control population numbers in troublesome areas as well as providing incentive to the trapper to exercise this control.

Steel traps are used twice as often as guns to control muskrats (Table 3) throughout the year and appear more effective (Table 4); ten times more muskrats are reported taken with steel traps than with guns. However, mortality caused by guns may be more difficult to determine as fatally wounded animals may sink or swim away and die out of sight of control personnel. Only 17% of the agencies reported the number of muskrats taken during control operations, consequently a statewide estimate of 25,000 is conservative.

* * *

Table 3. Reported control methods used to control muskrats by water service agencies in California, 1978.

<u>Type of Control Used</u>	<u>% of Combined Control</u>
Steel traps	46.3
Other (primarily guns)	26.5
Poison	11.8
Lollipop (poison bait stations)	8.0
Habitat alteration	7.3

* * *

Table 4. Reported muskrat kill by control method, of water service agencies in California, 1978.

	<u>No. of Muskrats Reportedly Killed</u>	<u>% of Total Kill</u>
Steel traps	22,500	90.5
Poison	100	.4
Lollipop (poison bait station)	15	.06
Other (primarily guns)	2,250	9.0
TOTAL KILL	24,865	

* * *

About 20% of the reporting agencies use poison bait or lollipops (poisoned bait held together and to a stick with paraffin) (Table 3). The number of muskrats which succumb to these control methods appear to be insignificant; however, the deaths caused by poisons also are difficult to monitor as carcasses frequently remain undiscovered.

Habitat alteration is employed by a few of those agencies reporting. A decrease in the carrying capacity through habitat alteration may cause a decrease in the muskrat population. Unless the population size were known before habitat alteration occurred, a consequent decrease in population size would be difficult to ascertain. Also, unless the habitat were maintained at sub-optimum for the muskrats, the population of muskrats would increase as the treated area reverted to better quality habitat.

DISCUSSION

While the muskrat is native along the Colorado River and along streams and lakes of northeastern California, it has been introduced into other areas in

California. The response to the questionnaire used in the study indicates that muskrats are effectively established throughout much of the state. Damage causing populations appear to reside primarily in the Central Valley, in counties where agriculture is the premier industry. Other counties, out of the Central Valley, reporting muskrat damage are also highly agricultural.

The estimated muskrat caused damage must be considered minimal. Frequently muskrat caused damage goes unnoticed as such or is handled in normal maintenance procedures and is not identified and separated out as muskrat damage. Likewise, the damage reported here only represents a sample of the 640 water service agencies in the state and does not consider much damage actually incurred by the farmer/rancher. The estimate of annual muskrat caused damage to water control agencies, generated by this report, may be 100% greater since 47% of the water service districts were not able to estimate damage costs.

For those who do employ control measures, steel traps are the most widely used and most effective. Banning this device from use would cause many water districts and farmers to drastically change their control methods, which may be costly; or even forego control which would be more costly. The California Department of Agriculture (Koehler and Dana 1971) indicates that when the price of muskrat pelts is high, trappers are effective in reducing muskrat populations considerably, with consequent reduction in damage.

Muskrat mortality via other methods of control is difficult to measure. As muskrats have gained a strong foothold in certain areas, with resultant extensive damage, agencies are employing those methods within their means to control these depredating animals. This usually results in the use of the most cost effective method.

LITERATURE CITED

- Grinnell, J., J. S. Dixon and J. M. Linsdale. 1937. Furbearing mammals of California. Univ. of Calif. Press, Berkeley, CA. 2 Vols. 777 pp.
- Koehler, J. W. and R. H. Dana. 1971. The muskrat problem in the Sacramento - San Joaquin river delta area. Calif. Dept. of Agriculture, Weed and Vert. Pest Control, mimeo report. 11 pp.
- Seymour, G. D. 1954. Recent extension of the range of muskrats in California. Calif. Fish and Game 40(4):375-384.

DEPARTMENT OF FISH AND GAME

1416 NINTH STREET
SACRAMENTO, CALIFORNIA 95814



Return to: Nongame Wildlife Investigations
California Department of Fish & Game
1416 Ninth Street
Sacramento, CA 95814
(916) 322-1261

In view of efforts directed to prohibiting the use of traps we are attempting to assess statewide muskrat damage and determine the type and extent of control measures currently in use. Your cooperation and a prompt reply will be greatly appreciated. Please complete the following questionnaire and return it no later than April 10, 1978.

Do you have muskrats in your area? Yes _____ No _____

Do you suffer any muskrat caused damage? Yes _____ No _____

What type(s) of damage do muskrats cause?

1. Burrowing in levees. _____
2. Gnawing control gates and other structures. _____
3. Crop depredation. _____
4. Other. _____ Please specify: _____

In dollars, what is the average amount of each kind of damage that occurs annually?

- | | |
|----------|----------|
| 1. _____ | 3. _____ |
| 2. _____ | 4. _____ |

Do you have a muskrat control program? Yes _____ No _____

Do you use?: government trapper _____, private trapper _____,
your own personnel _____, other, please specify _____

Do you initiate control? As needed _____, summer only _____, winter only _____,
continuously _____, other, please specify _____

What type(s) of control is employed? Steel traps____, poison bait____, lollipops (poison bait in a paraffin block on a stick)____, habitat alteration____, do not know____, other, please specify_____

Do you allow or otherwise control trapping activity by licensed fur trappers during the fur trapping season? Yes____ No____

Do you have information on the number of muskrats taken during control operations and/or fur trapping? Yes____ No____. If so, how many?_____

Person completing questionnaire:

Name: _____

Telephone Number: _____

Comments: _____

Thank you for participating in our survey. If you have any questions or would like a copy of our findings, please feel free to contact this office.

Thank you for you cooperation.

Sincerely,

EC Fullerton

Director