

# STUDY GUIDE

## A Guide to California Ground Squirrels

### Identification, Biology and Control Methods

Follow along with the Guide and fill in the blanks with the appropriate answer. If you feel you've missed or skipped a question, you can always go back to the section that contains the answer to that question. Don't worry about filling in every blank the first time around, as you will find yourself missing important information. Once completed, you must take the Quiz at the end of the presentation. Feel free to refer to this Study Guide when needed.

### Identification

1. California Ground Squirrel identification can be done by observing their \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.

### Physical Description

2. The ground squirrel's body measures \_\_\_\_ to \_\_\_\_ inches. Its semi-bushy tail adds another \_\_\_\_ to \_\_\_\_ inches.
3. The fur is \_\_\_\_\_ - \_\_\_\_\_ and speckled with \_\_\_\_\_ - \_\_\_\_\_ along the back; the sides of the head and shoulders are light gray to off-white. One subspecies that occupies most of Northern California has a dark, \_\_\_\_\_-shaped patch on its back between the shoulders; this patch is missing from other species.

### Behavior

4. Ground Squirrels live on \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_ while avoiding thick chaparral and dense woods.
5. The California ground squirrel has \_\_\_\_ internal cheek pouches on either side of the mouth, which are used to \_\_\_\_\_. Seeds lying on the ground surface are hulled and eaten as found.
6. During the rainy months, November to March and April, ground squirrels feed chiefly on green herbage such as \_\_\_\_\_.

### Burrows

7. All species of ground squirrels \_\_\_\_\_, which are used for \_\_\_\_\_, \_\_\_\_\_ during hot or rainy weather, \_\_\_\_\_, \_\_\_\_\_, and for \_\_\_\_\_.
8. Burrows are made in \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and in \_\_\_\_\_. There is no evidence that ground squirrels plug the entrances to their burrow systems.
9. California ground squirrel burrows average about \_\_\_\_\_ inches in diameter, with individual burrows being between \_\_\_\_\_ to \_\_\_\_\_ feet in length.

## Damage

10. Crops of grain, fruits and nuts such as \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_ fall victim to squirrel feeding habits.
11. Young orchards are sometimes damaged by gnawing of the bark, which deprives the trees of essential nutrients only found in the green area of the trunk beneath the bark. This damage is known as “\_\_\_\_\_.”
12. Squirrels also eliminate vegetation by clearing and trampling areas around \_\_\_\_\_ and \_\_\_\_\_.
13. The threat of seepage or collapse of \_\_\_\_\_ and \_\_\_\_\_ requires the elimination and control of these burrowing rodents where they inhabit such places.
14. Seeds of both wild and cultivated plants, particularly \_\_\_\_\_, are taken in quantity.
15. Circumstantial evidence points to ground squirrels as the host to plague-infected \_\_\_\_\_ in over half the reported human plague cases in California in the last 40 years.
16. Ground squirrels are also associated with the spread of \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_.

## Hibernation

17. All California ground squirrels living at high altitudes and some of the population mostly mature adults, at lower elevations \_\_\_\_\_ for a part of each year during the \_\_\_\_\_.
18. After going below ground, the squirrel plugs the tunnel just above the nest with earth to as much as \_\_\_\_\_ feet in length, and then curls up in its nest below the tunnel plug. The burrow entrance remains open.
19. Emergence occurs in \_\_\_\_\_ or \_\_\_\_\_.

## Breeding

20. In the interior valley, females carrying young are most numerous in the month's of \_\_\_\_\_ and \_\_\_\_\_. In Los Angeles County, regular breeding activity begins by \_\_\_\_\_; along the coast and in the mountains, the breeding season comes somewhat later.
21. Ground squirrels produce \_\_\_\_\_ litter a year. Litter size varies according to population density and other factors; 7 or 8 being an average size litter but can range from \_\_\_\_\_ to \_\_\_\_\_.
22. The young grow rapidly and are seen in great numbers from late \_\_\_\_\_ until \_\_\_\_\_, when they scatter out to new territory, or move to unoccupied burrows.

## Control Methods

23. As the peak breeding season nears, the ratio of males to females in the above ground population tends to equalize and control undertaken at this time will give maximum results. \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_ are all methods of control that when used appropriately can be effective.

## Exclusion

24. Permanent exclusion of squirrels can be obtained by installing \_\_\_\_\_, but in this case the expense is usually prohibitive in its use.
25. Exclusion using \_\_\_\_\_ is rarely practicable because of the animals climbing and digging ability.

26. The use of \_\_\_\_\_ to 'cap' the top of a fence, more than 4 feet high, may prevent them from climbing over.

### Habitat Modification

27. Ground squirrels can be limited by frequent \_\_\_\_\_; deep discing or plowing should be conducted as close to field borders and fences as possible.

28. Good housekeeping practices should also be implemented. Eliminating \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_ from field margins will assist in squirrel control.

### Fumigants

29. Before fumigation, check the label of the product to make sure that there are no restrictions on use and that the burrow is not inhabited by other animals such as \_\_\_\_\_.

### Fumigant General Knowledge

30. Fumigants are most effective when soil moisture is \_\_\_\_\_ allowing it to hold the gas within the burrow system.

31. Check burrows \_\_\_\_\_ to \_\_\_\_\_ hours after initial application.

### Aluminum Phosphide

32. Commercially available as \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.

33. Pack the opening with \_\_\_\_\_ and seal tightly by shoveling dirt over the entrance.

34. Use lower amounts in small burrows or under \_\_\_\_\_ soil conditions, and higher doses in large burrows when soil moisture is \_\_\_\_\_.

35. DO NOT add \_\_\_\_\_ to the treated burrow or wrap the tablets in \_\_\_\_\_. If the soil moisture is adequate, adding water is not necessary.

### Gas Cartridges

36. They are mixtures of active ingredients and compressed sawdust. When ignited, they give off toxic gases and smoke that are effective only when in \_\_\_\_\_ such as burrows.
37. With a sharp object the diameter of a \_\_\_\_\_, puncture the cap end at marked points on the cartridge and rotate, loosening the material inside.
38. If smoke is seeping from the nearby connected burrows, treat and close them as well. Well-established burrow systems usually require \_\_\_\_ or more cartridges.

### **Acrolein**

39. Acrolein is commercially known as “\_\_\_\_\_.” It is a restricted use material and is not commonly used in California
40. Create a seal by shoveling soil onto the applicator device and the burrow entrance to prevent \_\_\_\_\_.
41. The fumigant is to be released at a rate of \_\_\_\_\_ per burrow.

### **Chemical Baits**

42. There are two main types of chemical baits: Chlorophacinone and Diphacinone otherwise known as \_\_\_\_\_.

### **Anticoagulant General Knowledge**

43. The most commonly used bait mediums are \_\_\_\_\_ because they are usually received well by squirrels.
44. Bait must be eaten over a period of \_\_\_\_\_ to a \_\_\_\_\_ or more to achieve adequate control.

### **Bait Stations**

45. Bait stations should have entrance holes large enough to admit squirrels but not larger animals. Generally, \_\_\_\_ inches in diameter is adequate.
46. Place \_\_\_\_ to \_\_\_\_ pounds of bait in a posted and covered bait box or a PVC bait station in areas frequented by ground squirrels such as near runways and burrow entrances.
47. Inspect bait stations \_\_\_\_\_ and add bait as needed. Continue until all feeding ceases, which can be between \_\_\_\_ to \_\_\_\_ weeks.

48. Initial acceptance may take up to \_\_\_\_ days until the squirrels become accustomed to the bait box in their environment.

### **Spot Baiting (with repeated treatments)**

49. This is the treatment of \_\_\_\_\_ usually done by distributing bait by hand to those targeted burrows.

50. Scatter a \_\_\_\_ of a cup of bait evenly over \_\_\_\_ to \_\_\_\_ square feet near active burrow entrances and runways.

51. Retreat after \_\_\_\_ to \_\_\_\_ days, or \_\_\_\_ to \_\_\_\_ hours. If the squirrel population is heavy, an additional treatment may be necessary.

### **Broadcast Baiting**

52. Broadcast Baiting is the treatment of a \_\_\_\_\_ ground squirrels inhabit. Bait is evenly distributed by \_\_\_\_\_, \_\_\_\_\_, or \_\_\_\_\_ through the infested regions.

53. Bait applied with a mechanical broadcaster should be applied at \_\_\_\_ pounds per swath acre.

54. Retreat after \_\_\_\_ days. If the squirrel population is heavy, an additional treatment may be necessary.

55. An uninterrupted supply of bait should be available for \_\_\_\_ to \_\_\_\_ days.

### **Zinc Phosphide General Knowledge**

56. Zinc Phosphide is a Restricted Use Pesticide. It is a single dose toxicant available in \_\_\_\_\_ or \_\_\_\_\_ form. The bait is usually applied by \_\_\_\_\_ or \_\_\_\_\_. Always follow product label directions, as Zinc Phosphide is potentially hazardous to ground feeding birds, especially waterfowl, specifically if applied to bare ground.

### **Spot Baiting**

57. Evenly scatter \_\_\_\_ tablespoon of bait or \_\_\_\_ baits per pound on bare soil. This should cover \_\_\_\_ to \_\_\_\_ square feet at the side or behind an active burrow entrance.

58. Do not retreat for at least \_\_\_\_ months.
59. Bait should be \_\_\_\_\_ and \_\_\_\_\_ of upon completion of the rodent control program.

### **Broadcast Baiting**

60. Spread bait evenly by hand, machine spreader, or aircraft at the rate of \_\_\_\_ pounds per swath acre through infested locations.
61. Do not \_\_\_\_\_ or place in piles.
62. Do not retreat for at least \_\_\_\_ months.
63. Bait should be \_\_\_\_\_ of upon completion of rodent control program.

### **Trapping General Knowledge**

64. Trapping can be effective when the squirrel population is \_\_\_\_\_ and in situations where other control methods are not appropriate.
65. Trapping ground squirrels requires a \_\_\_\_\_ issued by the Department of Fish and Game.
66. California Fish and Game Code \_\_\_\_\_ transporting and releasing squirrels without a permit.

### **Kill Trap General Knowledge**

67. Kill trapping is labor intensive but is an effective method for controlling \_\_\_\_\_ to \_\_\_\_\_ squirrel populations over small areas where poisons may not be appropriate.
68. Trapping can be conducted anytime squirrels are not \_\_\_\_\_.
69. One trap every \_\_\_\_ to \_\_\_\_ burrow entrances is sufficient, and will reduce populations over several weeks.
70. To increase bait trap effectiveness, leave them \_\_\_\_\_ and unset for \_\_\_\_\_ days. This allows the squirrels to become accustomed to them.
71. Once squirrels are readily taking bait from the unset traps, set them. Effective baits that can be used include \_\_\_\_\_,

\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_,  
\_\_\_\_\_ and \_\_\_\_\_.

### **Box Traps**

72. Once set, place it near the \_\_\_\_\_, and make sure that it is seated to the ground and stable enough so that it won't tip over.
73. Reset the traps in a different location if no squirrel is caught within \_\_\_\_\_ to \_\_\_\_\_ days.

### **Tunnel/Tube Traps**

74. These can be set directly in the squirrel's trail and can be baited with \_\_\_\_\_, \_\_\_\_\_, or \_\_\_\_\_.
75. These traps offer protection to other \_\_\_\_\_ animals and are strong enough to be used in horse pastures or around domestic animals.

### **Conabear Trap**

76. The trap has a catch opening approximately \_\_\_\_\_ inches by \_\_\_\_\_ inches with a single spring. A more powerful version has two springs.
77. This type of trap can be used \_\_\_\_\_ or \_\_\_\_\_, and should be placed over a burrow entrance.

### **Carcass Removal**

78. Wild rodents can be reservoirs of diseases transmissible to humans, including a frequently lethal strain of \_\_\_\_\_.
79. Protective clothing should be worn, including \_\_\_\_\_ or \_\_\_\_\_ and \_\_\_\_\_ (or other work clothing).
80. Never \_\_\_\_\_, \_\_\_\_\_, or \_\_\_\_\_ while trapping.
81. Dispose of the \_\_\_\_\_ carcass as permitted by local regulations.

### **Live Traps General Knowledge**

82. Live trapping is not recommended because of the problem of disposing of the live ground squirrel. \_\_\_\_\_ or \_\_\_\_\_ trapped animals away from the trap site is illegal in California without a permit from the Fish and Game Department.
83. If live trapping is necessary, the ground squirrel must be euthanized humanely. \_\_\_\_\_ Gas is considered humane.

## Cage Traps

84. Place traps along \_\_\_\_\_ where you have seen ground squirrel travel.
85. Pre-baiting is recommended. Place bait in the trap for several days with the trap unset in order to 'condition' the ground squirrels.  
\_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_ are attractive baits.
86. Check \_\_\_\_\_, once you notice bait being eaten.
87. Once it's established that the ground squirrels are feeding from the traps, you can set the traps properly \_\_\_\_\_.
88. Always check traps \_\_\_\_\_, making sure that non-targeted animals are not being caught.
89. Remember, \_\_\_\_\_ directly handle live Ground Squirrels.