= Gray @-@ tailed vole =

The gray @-@ tailed vole (Microtus canicaudus) also known as the gray @-@ tailed meadow vole or gray @-@ tailed meadow mouse , is a rodent in the genus Microtus (small @-@ eared " meadow voles ") of the family Cricetidae . Voles are small mammals , and this species lies roughly in the middle of their size range . First collected in 1895 , it is endemic to the Willamette Valley , Oregon , and Clark County , Washington , in the Pacific Northwest region of North America . Historically , they were found in the prairie areas of the Valley and , though many of these areas have been converted for agricultural purposes , these animals remain common . For reasons that remain unclear , vole population densities in any area may fluctuate widely from season to season and year to year . They are preyed upon by owls , hawks , and carnivorous mammals , and their parasites include fleas and ticks . These voles build underground burrows and complex tunnel networks , which they sometimes share with other burrowing animals . Relatively little is known about their behavior in the wild , because they are elusive and unlikely to enter traps .

= = Taxonomy = =

The scientific name of the gray @-@ tailed vole is Microtus canicaudus . The generic name Microtus derives from the Ancient Greek words ?????? (small) and ??? (ear) . The species name canicaudus derives from the Latin canens (gray) and cauda (tail) . The gray @-@ tailed vole was first described in 1897 by Gerrit S. Miller in the Proceedings of the Biological Society of Washington . The type specimen was collected in McCoy , Oregon , on December 1 , 1895 , by B.J. Bretherton . Miller 's initial examination included the type specimen and eleven others . Two from his collection had been obtained in Beaverton . The remaining specimens , collected in McCoy , were part of the US National Museum Biological Survey under C. Hart Merriam .

The gray @-@ tailed vole is monotypic , but there are some differences between specimens obtained on either side of the Columbia River . It appears to be a sibling species of the montane vole (Microtus montanus) or of Townsend 's vole (M. townsendii) . It was classified as a geographic race or subspecies of the montane vole by Hall and Kelson in 1951 , but laboratory analyses , including electrophoresis and karyotype evaluations , subsequently confirmed that they are two separate species . The karyotypes of the montane vole and the gray @-@ tailed vole are dissimilar in terms of homology in 6 of 22 autosomal arms . The quantity and distribution of heterochromatin among both X chromosomes and autosomes is different as well . The two species are allopatric , but not contiguously so .

= = Description = =

The gray @-@ tailed vole is a small mammal in the middle of the size range for voles in general . The fur on the back is yellowish @-@ brown or yellowish @-@ gray . They have a short tail , black or brown above and grayish below . The young have gray fur on the underside and a darker , " sooty " gray on the back . The feet of the young are dusky , and they have a gray tail with a black stripe . They are similar in size and overall appearance to the montane vole , but with a more yellowish fur and a grayer tail . The type specimen measured 135 mm (5 @.@ 3 in) in total length . The tail vertebrae measured 33 mm (1 @.@ 3 in) and the hind foot measured 20 mm (0 @.@ 79 in) . Typical adults average 141 mm (5 @.@ 6 in) in total length , with a 35 mm (1 @.@ 4 in) tail . The feet measure 20 mm (0 @.@ 79 in) and the ears 12 mm (0 @.@ 47 in) . On each side they have an upper and lower incisor and three upper and lower molars , for a total of 16 teeth .

Gray @-@ tailed voles are sympatric with Townsend 's vole (M. townsendii) , with which they share many similarities . They can be distinguished by appearance , because Townsend 's vole has darker colorings , a longer tail , and differences in the structure of the hard palate . Gray @-@ tailed and montane voles also differ in some aspects of hard palate structure , especially the incisive foramina . The gray @-@ tailed vole shares its geographic range with the creeping vole (Microtus oregoni) as well . The gray @-@ tailed vole has a sturdier build , larger eyes , and some differences

in the upper molars .

= = Distribution and habitat = =

The gray @-@ tailed vole is endemic to the Willamette Valley , Oregon , and to Clark County , Washington . Its range in Oregon extends from Scappoose and Gresham in the north , through the Willamette Valley to around Eugene . Reports of the species east of the Cascades have been called into question . Gray @-@ tailed voles are prevalent in agricultural areas : they are found in and around pastures , hayfields , grain fields , and disturbed habitats . They once inhabited grassy prairies of the valley . These prairies were burned annually by Native Americans , with uncertain effects on vole populations .

Vernon Orlando Bailey describes the Willamette Valley as part of the humid division of the Transition Zone . Annual precipitation there is 40 in (100 cm) , falling mostly in the winter . The valley is warmer and drier than the surrounding hills , less heavily forested , and better suited to agricultural use . In 1901 , zoologist Edmund Heller visited McCoy , where the type specimen of the gray @-@ tailed vole had been collected . The account of his journey is relayed by Daniel Giraud Elliot , referring specifically to the terrain inhabited by the gray @-@ tailed vole .

Heller described the area around McCoy as " much the same kind of country as Beaverton , but more level and forested . The coast range is about fifteen miles distant . In some places , forests of Douglas fir occur , but the land is chiefly open and grassy . White oaks and a few yellow pine occur also , and the region I should judge was more Transition than that at Beaverton . " He described Beaverton as : " low and rolling , but hills are entirely lacking in the immediate vicinity of the town . The timbered land is covered with forests of yellow pine (Pinus jeffreyi) , Douglas fir (Pseudotsuga taxifolia) , white oak (Quercus zarryana) , etc . The soil is chiefly black adobe except on the higher parts , where it is largely clay . The region evidently is Transition in character of its vegetation as shown by the presence of the yellow pine and white oak . "

Mammals sharing the Transition Zone with the gray @-@ tailed vole include : Roosevelt elk , Columbian black @-@ tailed deer , Columbian white @-@ tailed deer , Washington rabbit , brush rabbit , silver gray squirrel , Douglas 's squirrel , Townsend 's chipmunk , Douglas 's ground squirrel , Oregon flying squirrel , dusky wood rat , ruddy deer mouse , California red @-@ backed mouse , red tree vole , white @-@ footed phenacomys , Townsend 's vole , Oregon creeping mouse , mountain beaver (Aplodontia rufa) , jumping mice including Zapus princeps and Zapus trinotatus , Camas pocket gopher , Mazama pocket gopher , and northwest coast bobcat (Lynx rufus fasciatus) . Birds in the range include : sooty grouse , Oregon ruffed grouse , band @-@ tailed pigeon , California pygmy owl , Harris 's woodpecker , northern pileated woodpecker , Lewis 's woodpecker , Vaux 's swift , Steller 's jay , Townsend 's warbler , western winter wren , California creeper , Oregon chickadee , chestnut @-@ backed chickadee , wrentit , western golden @-@ crowned kinglet , and black @-@ headed grosbeak .

= = Behavior = =

Gray @-@ tailed voles are burrowing rodents that construct complex networks of tunnels and burrows . They may also nest above ground , sheltered under wood , abandoned equipment , or other agricultural debris . They are known to use the tunnel networks of the Camas pocket gopher . The tunnels are built to provide shelter during wet periods , which are frequent throughout their range . When the tunnels flood , the voles swim to dry areas or chambers in which air has been trapped . If the networks flood completely , they will head for higher ground . As many as 20 ? 30 voles have been seen gathered on dry fence posts in flooded areas . When approached , they swam to safer ground nearby . Where tunnels intersect , they sometimes establish middens 8 ? 15 cm (3 @.@ 1 ? 5 @.@ 9 in) long by 3 ? 5 cm (1 @.@ 2 ? 2 @.@ 0 in) wide by 8 ? 10 cm (3 @.@ 1 ? 3 @.@ 9 in) deep .

Gray @-@ tailed voles are difficult to capture live in the wild , as they are unlikely to enter enclosure type traps . The most effective traps are laid inconspicuously along commonly used runways , so

that the voles run directly into them . Much of what is known about the voles has been obtained from observing them in captivity .

= = Ecology = =

Information about the reproductive habits of gray @-@ tailed voles is based on studies of captive animals . In captivity , female voles as young as 18 days , weighing only 12 @.@ 5 g (0 @.@ 44 oz) are capable of reproducing . Litters produced by these younger females result in larger litters , newborns of smaller mass , and lower rates of newborn survival . The gestation period is 21 ? 23 days . The newborns weigh around 2 @.@ 5 g (0 @.@ 088 oz) . The average litter size is around 4 @.@ 5 . It is uncertain how frequently gray @-@ tailed voles breed . Breeding likely occurs year round .

Gray @-@ tailed voles recognize relatives based on familiarity . Under laboratory conditions , gray @-@ tailed voles familiar with one another produced fewer litters than unfamiliar ones . Pairings of related voles resulted in lower pup survival than did pairings of unrelated individuals . Common foods of the gray @-@ tailed vole in the wild are thought to be grasses , clover , wild onion , and false dandelion . Published claims that the voles are omnivorous lack references or evidence .

Although gray @-@ tailed voles are now described as common , Bailey reported them to be so scarce that few specimens were available . He also claimed that they were present east of the Cascades , but subsequent authorities have refuted this . Their population density fluctuates widely during the year . There is not much data available to calculate population density in the field , but studies in more controlled settings yield estimates of around 600 animals per 1 hectare (2 @.@ 5 acres) .

= = Human interactions = =

Gray @-@ tailed voles are have been used in laboratory research projects . They have been used to study the effects of mineral deficiencies , such as selenium , which is lacking in Willamette Valley soils . They have also been used in studies on livestock feed modifications , including pretreatment of feeds by fermentation , sprouting the grains in the feeds , and clearance of radioactive isotopes from contaminated food .

Gray @-@ tailed voles can become so abundant within their range that humans may take measures to control populations . Trapping them is challenging .

= = Conservation status = =

The gray @-@ tailed vole is listed as " least concern " by the IUCN (International Union for Conservation of Nature) . No major threats to this common species are recognized . While its range is limited (less than 20 @,@ 000 km ^{2}) , it thrives in agricultural environments , so land conversion for such purposes is not problematic . This species is listed as secure by NatureServe .