

= Marsh rice rat =

The marsh rice rat (*Oryzomys palustris*) is a semiaquatic North American rodent in the family Cricetidae . It usually occurs in wetland habitats , such as swamps and salt marshes . It is found mostly in the eastern and southern United States , from New Jersey and Kansas south to Florida and northeasternmost Tamaulipas , Mexico ; its range previously extended further west and north , where it may have been a commensal in corn @-@ cultivating communities . Weighing about 40 to 80 g (1 @.@ 4 to 2 @.@ 8 oz) , the marsh rice rat is a medium @-@ sized rodent that resembles the common black and brown rat . The upperparts are generally gray @-@ brown , but are reddish in many Florida populations . The feet show several specializations for life in the water . The skull is large and flattened , and is short at the front .

John Bachman discovered the marsh rice rat in 1816 , and it was formally described in 1837 . Several subspecies have been described since the 1890s , mainly from Florida , but there is disagreement over their validity . The Florida Keys population is sometimes classified as a different species , the silver rice rat (*Oryzomys argentatus*) . Data from the mitochondrial cytochrome b gene indicate a deep divergence between populations east of Mississippi and those further west , which suggests that the western populations may be recognized as a separate species , *Oryzomys texensis* . The species is part of the genus *Oryzomys* , which also includes several others occurring further south in Mexico , Central America , and northwestern South America , some of which have previously been regarded as subspecies of the marsh rice rat . One , *Oryzomys couesi* , occurs with the marsh rice rat in Tamaulipas and southern Texas .

The marsh rice rat is active during the night , makes nests of sedge and grass , and occasionally builds runways . It has a diverse diet that includes plants , fungi , and a variety of animals . Population densities are usually below 10 per ha (4 per acre) and home ranges vary from 0 @.@ 23 to 0 @.@ 37 ha (0 @.@ 57 to 0 @.@ 91 acres) , depending on sex and geography . Litters of generally three to five young are born after a pregnancy of about 25 days , mainly during the summer . Newborns are helpless at birth , but are weaned after a few weeks . Several animals prey on the marsh rice rat , including the barn owl , and it usually lives for less than a year in the wild . It is infected by many different parasites and harbors a hantavirus that also infects humans . The species is not of conservation concern , but some populations are threatened .

= = Taxonomy = =

The marsh rice rat is classified as one of eight species in the genus *Oryzomys* , which is distributed from the eastern United States (marsh rice rat) into northwestern South America (*O. gorgasi*) . *Oryzomys* previously included many other species , which were reclassified in various studies culminating in contributions by Marcelo Weksler and coworkers in 2006 that removed more than 40 species from the genus . All are placed in the tribe Oryzomyini (" rice rats ") , a diverse assemblage of over 100 species , and on higher taxonomic levels in the subfamily Sigmodontinae of the family Cricetidae , along with hundreds of other species of mainly small rodents , most of which occur in South and Central America . In the United States , the marsh rice rat is the only oryzomyine rodent except for *Oryzomys couesi* in a small area of southern Texas ; the only other sigmodontines present are several species of cotton rats (*Sigmodon*) in the southern half of the country .

= = = Early history = = =

The marsh rice rat was discovered in 1816 in South Carolina by John Bachman . Bachman intended to describe the species as *Arvicola oryzivora* , but sent a specimen to Richard Harlan and Charles Pickering at the Academy of Natural Sciences in Philadelphia to confirm its identity . Another specimen , from New Jersey , was found in the Academy 's collection , and Harlan took it upon himself , against Pickering 's wishes , to describe the new species as *Mus palustris* , proclaiming it one of the few true rats of the United States . The specific name *palustris* is Latin for " marshy " and refers to the usual habitat of the species .

In 1854 , in *The quadrupeds of North America* , Bachman redescribed it as *Arvicola oryzivora* , considering it more closely related to the voles then placed in the genus *Arvicola* , and also recorded it from Georgia and Florida . Three years later , Spencer Fullerton Baird argued that the referral of the species to *Arvicola* was erroneous and introduced a new generic name for the marsh rice rat , *Oryzomys* . The name combines the Greek *oryza* " rice " and *mys* " mouse " and refers to the rat 's habit of eating rice . At the time , *Oryzomys* was recognized either as a full genus or as a subgenus of the now @-@ defunct genus *Hesperomys* , but since the 1890s , it has been universally recognized as a genus distinct from *Hesperomys* , with the marsh rice rat (*Oryzomys palustris*) as its type species .

= = = Species boundaries and subspecies = = =

In the 1890s , several subspecies of the marsh rice rat were described from the United States : *O. p. natator* from Florida in 1893 , *O. p. texensis* from Texas in 1894 , and *O. p. coloratus* from elsewhere in Florida in 1898 . Clinton Hart Merriam recognized *O. p. natator* as a separate species in 1901 and described a subspecies of it , *O. p. floridanus* , but considered *O. p. texensis* to be nearly identical to nominate *O. p. palustris* . In his 1918 revision of North American *Oryzomys* , Edward Alphonso Goldman again recognized all these as a single species , *Oryzomys palustris* . He distinguished four subspecies , which he said formed a " closely intergrading series " ? *O. p. palustris* from New Jersey to southeastern Mississippi and eastern Missouri ; *O. p. natator* in central Florida ; *O. p. coloratus* (including *O. natator floridanus* Merriam) in southern Florida ; and *O. p. texensis* from western Mississippi and southeastern Kansas to eastern Texas . Two additional subspecies were described by William J. Hamilton in 1955 from southern Florida : *O. p. planirostris* from Pine Island and two miles (3 km) north of Fort Myers and *O. p. sanibeli* from Sanibel Island . Also in 1955 , Claude W. Hibbard described a new species of *Oryzomys* , *O. fossilis* , from Pleistocene deposits in Kansas , on the basis of small differences in characters of the tooth with living marsh rice rats . In 1965 , Walter Dalquest demoted this species , later also found in Texas , to a subspecies , because it does not differ more from living marsh rice rats than the latter differ from each other .

Merriam and Goldman had recognized that a number of Central American species , including *Oryzomys couesi* and numerous forms with more limited distributions , are related to the marsh rice rat . *O. couesi* ranges north to southernmost Texas , where its distribution meets that of the marsh rice rat . In 1960 , Raymond Hall argued that specimens from the contact zone were intermediate between the local forms of *O. couesi* and the marsh rice rat , and accordingly included the former in the marsh rice rat . While reporting on the ecology of Texan *O. couesi* in 1979 , Benson and Gehlbach noted that populations of *O. couesi* and the marsh rice rat there were in fact distinct , with the latter being smaller and less brown and more gray in color ; their karyotypes were also distinct . Since then , the two have generally been retained as distinct species , as supported by further research ; a 1994 study even found the two to occur at some of the same places (in sympatry) in southern Texas and nearby Tamaulipas , Mexico .

In 1973 , rice rats were discovered at Cudjoe Key in the Florida Keys , and in 1978 Spitzer and Lazell described this population as a new species , *Oryzomys argentatus* . The status of this form ? either a distinct species or not even subspecifically distinct from *O. palustris natator* ? has remained controversial since ; the 2005 third edition of *Mammal Species of the World* does not recognize *O. argentatus* as a separate species , but acknowledges a need for further research . A 2005 study using microsatellite DNA found that Florida Keys rice rats exhibit low genetic variation and are significantly different from Everglades rice rats ; the study concluded in favor of classifying the Keys rice rat as a " distinct vertebrate population " . This population probably diverged from mainland rice rats about 2000 years ago .

Among the described subspecies , a 1989 morphometrical study by Humphrey and Setzer separated only two ? *O. p. natator* from much of Florida (including *O. p. coloratus* , *O. p. planirostris* , *O. p. sanibeli* , and *O. p. floridanus* , as well as *O. p. argentatus*) and *O. p. palustris* from the rest of the range (including *O. p. texensis*) . However , Whitaker and Hamilton in their 1998 book on the

Mammals of the Eastern United States recognized *O. p. planirostris* and *O. p. sanibeli* as separate subspecies, but merged all others into *O. p. palustris*, and placed *O. argentatus* as a separate species; their classification was based on their emphasis of overwater gaps as agents of biological diversification and a critique of shortcomings in Humphrey and Setzer's study, not on a reanalysis of the data.

In 2010, Delton Hanson and colleagues published a study of the relationships among populations of *Oryzomys* on the basis of data from three genes: the mitochondrial gene cytochrome b (Cytb) and two nuclear markers, exon 1 of the interphotoreceptor retinoid binding protein gene (Rbp3) and intron 2 of alcohol dehydrogenase gene 1 (Adh1 @-@ I2). The Cytb data placed all marsh rice rats studied sister to a clade containing various populations of *O. couesi*; the mean genetic distance between the two groups was 11 @-@ 30 %. The marsh rice rats fell into two main groups, differing on average by 6 @-@ 05 %, one containing animals from Mississippi, southwestern Tennessee, and further west, and the other including specimens from Alabama and further east. Within the eastern group, variation was only about 0 @-@ 65 %, though examples of the putative subspecies *O. p. palustris*, *O. p. coloratus*, *O. p. sanibeli*, and *O. p. planirostris* were all included. Data from both of the slower @-@ evolving nuclear markers Rbp3 and Adh1 @-@ I2 also placed examples of *Oryzomys* in two main clades, but did not recover the western and eastern groups of the marsh rice rat as separate clades. In addition, Adh1 @-@ I2 placed a Costa Rican population within the marsh rice rat clade and some other southern *Oryzomys* specimens closer to the marsh rice rat than to the *O. couesi* group. The combined data supported the western and eastern clades within the marsh rice rat and placed the Costa Rican population marginally closer to the marsh rice rat than to *O. couesi*. Using the genetic species concept, the authors suggested that the western populations of the marsh rice rat be recognized as a separate species, *Oryzomys texensis*. They recommended further research in the Mississippi ? Alabama ? Tennessee region, where the ranges of the two meet.

= = = Common names = = =

Many common names have been proposed for the marsh rice rat. Early describers used "Rice Meadow @-@ Mouse" and "Rice @-@ field Mouse" and in the early 1900s, name such as "rice rat", "marsh mouse", and "swamp rice rat" came into use. Some of the subspecies received their own common names, such as "Florida Marsh Mouse", "Swimming Rice Rat", and "Central Florida Rice Rat" for *O. p. natator*; "Bangs' Marsh Mouse", "Cape Sable Rice Rat", and "Everglades Rice Rat" for *O. p. coloratus*; and "Texas Rice Rat" for *O. p. texensis*. The species is now usually known as the "marsh rice rat", although "marsh oryzomys" has also been in recent use. The Florida Keys form (*argentatus*) is known as the "silver rice rat".

= = Description = =

The marsh rice rat is a medium @-@ sized rodent that looks much like the common black and brown rats, but has greater differences in color between the upper- and underparts. The fur is thick and short. The upperparts are generally gray to grayish brown, with the head a bit lighter, and are sharply delimited from the underparts, which are off @-@ white, as are the feet. There are small cheek pouches. The ears are about the same color as the upperparts, but there is a patch of light hairs in front of them. The tail is dark brown above and may be paler below. The guard hairs are long and have unpigmented, silvery tips. When rice rats swim, air is trapped in the fur, which increases buoyancy and reduces heat loss. As in most other oryzomyines, females have eight mammae.

The forefeet have four and the hindfeet five digits. On the forefeet, the ungual tufts (tufts of hair on the digits) are absent. The hindfeet are broad and have a short fifth digit. Many of the pads are reduced, as are the ungual tufts, but there are small interdigital webs. The Florida Keys form, *argentatus*, has even more reduced ungual tufts. Many of these traits are common adaptations to life in the water in oryzomyines.

There is some geographic variation in fur color : western populations (*texensis*) are lighter than those from the east (*nominata palustris*) , and Florida populations are generally more tawny or reddish than either , with those from southern Florida (*coloratus*) being brighter than those from the center of the state (*natator*) . The Florida Keys form (*argentatus*) is silvery , and the two other Florida forms ? *planirostris* and *sanibeli* ? lack the reddish tones of mainland Florida populations and are instead grayish , resembling *nominata palustris* (*planirostris*) , or brownish (*sanibeli*) . In 1989 , Humphrey and Setzer reviewed variation in color among Florida populations . They found *argentatus* to be substantially lighter and *planirostris* and *sanibeli* to be somewhat darker than mainland populations , and *argentatus* to have a less yellow fur , but found no significant differences in redness . There was also substantial variation within populations .

Total length is 226 to 305 mm (8 @. @ 9 to 12 @. @ 0 in) , tail length 108 to 156 mm (4 @. @ 3 to 6 @. @ 1 in) , hindfoot length 28 to 37 mm (1 @. @ 1 to 1 @. @ 5 in) , and body mass 40 to 80 g (1 @. @ 4 to 2 @. @ 8 oz) , with males slightly larger than females . The largest individuals occur in Florida and along the Gulf Coast east of the Mississippi River delta .