

---

*(Rattus rattus)*

\*

( // : // : )

Archive of SID

(Rabinowitz,1997)

(Wilson, 1999)

( ) ( )  
(Sinclair et al., 2006)

(Malekian, 2000)

(Wilson et al., 2007)

King, )

(2005)

(Pryde et al, 2005)

(King, 2005)

(Etemad, 1978)

(Ghadirian,2007)

(Evans, 1994)

(Zehzad & Madjnoonian,1998)

(*Avicennia marina*)

Danehkar, )

(2001)

---

ƒ-Total Count

---

١-Exotic species  
٢-Black rat, *Rattus rattus*  
٣-Cosmopolitan

$$s_t = m_t + u_t$$

$$n_t = t$$

(Daneshkar, 2001)

(Krebs, 1999)

$$i = c_i$$

$$i = K_i$$

$$i = f_i$$

$$i = F_i$$

$$y = (K_i \cdot x) \cdot (c_i/f_i)$$

$$x = (y=0)$$

$$(N)$$

(Krebs, 1999)

(Krebs, 1999)

$$(Krebs, 1999) \quad B$$

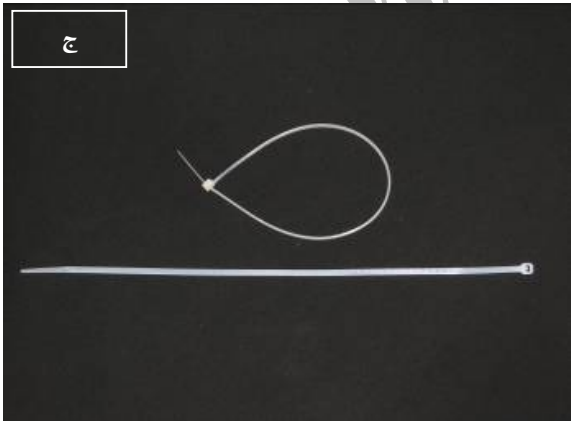
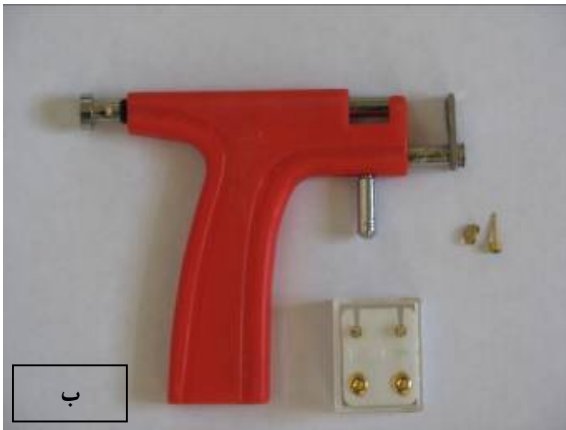
$$t = m_t$$

$$t = u_t$$

$$t = n_t$$

◦-IBA: Important Bird Area  
 ♣-Capture-mark-recapture  
 ♣-Removal Methods

$\frac{1}{1} \pm \frac{1}{1} \pm \frac{1}{1}$   
 $\frac{1}{1} \pm \frac{1}{1} \pm \frac{1}{1}$



شکل ۱- وسائل و تجهیزات مورد استفاده در برآورد جمعیت الف) تله قفسی، ب) گوشواره رنگی و گوش سوراخ کن و ج) بست شماره دار

) ( ) ( × ×

( )

Ecological Methodology

/

)

( )

%

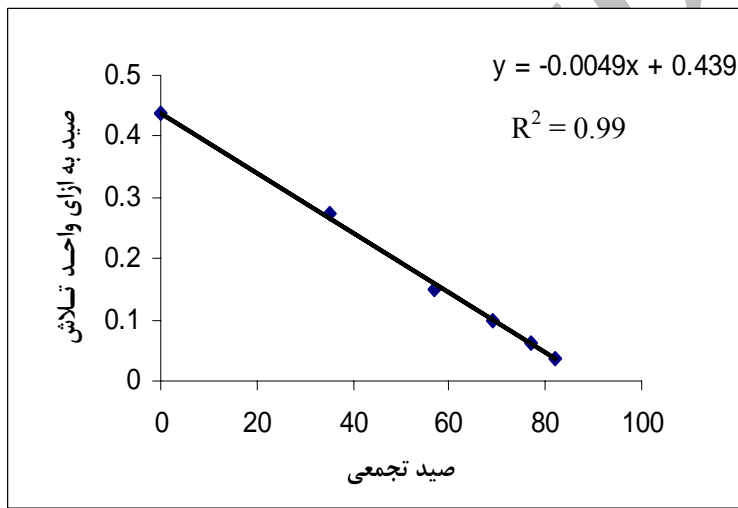
$\frac{1}{1} \pm \frac{1}{1} \pm \frac{1}{1}$

۸- GPS مدل Garmin etrex-summit

۹- Trap night



$(F_i)$	$(K_i)$	$(c_i/f_i = Y_i)$	$(f_i)$	$(c_i)$
		.		
		.		
		.		
		.		
		.		
		.		



( )  
 ( )  
 ( ) Wilson . ( )

% ( )  
 ( ) ( / )  
 ( / / %

( ) Brown .(Wilson *et al*, 2007)

	$\pm SE$	
/	/ $\pm$ /	
/	/ $\pm$ /	
/	/ $\pm$ /	
/	/ $\pm$ /	
/	/ $\pm$ /	
/	/ $\pm$ /	
/	/ $\pm$ /	
/	/ $\pm$ /	

/  
(% / / )  
(Brown *et al* 1996)

Archive of SID

## References

- Brown, K.P.; H. Moller; J. Innes and N. Alterio. 1996. Calibration of Tunnel Tracking Rates to Estimate Relative Abundance of Ship Rats (*Rattus rattus*) and Mice (*Mus Musculus*) in a New Zealand forest. *New Zealand journal of Ecology*, 20(2): 271-275.
- Danehkar, A. 2001. Interaction of *Aveicennia marina* Trees and Related Animals in Mangrove Forest of Qeshm and Khamir Region (Hara Biospheric Reserve). PhD Thesis in Forestry, Faculty of Natural Resources, Tarbiat Modares University, Noor, 131p.
- Etemad, E.1978. The Mammals of Iran. Volume 1. Rodents and Key to Their Classification. National Society for Protection of Natural Resources and Human Environment, Teheran, 288 pp (in Farsi, with a summary in English).
- Evans, M.I. 1994. Important Bird Areas in the Middle East. Birdlife conservation series No.2. Birdlife international, Cambridge, U.K. 410p.
- Ghadirian, T.2007. A Study on Habitat and population Density and Abundance of Black Rat *Rattus rattus* in Hara Biosphere Reserve - Hormozgan Province-Iran. M.Sc Thesis in Biodiversity, Islamic Azad University, research and science campus.100 pp.
- King, C.M. 2005. The Handbook of New Zealand Mammals. Second Edition, Oxford University Press, 610p.
- Krebs, C.J. 1999. Ecological Methodology. Addison-Welsey Educational Publishers, Benjamin/ Cummings, USA, 620p.
- Malekian, M .2000. Introduced species: a threat to biodiversity, The full text proceeding of 1<sup>st</sup> Seminar on Biodiversity and Paleontology. Kerman, Iran Pp 279-283.
- Pryde, M.; P. Dilks and I. Fraser. 2005. The Home Range of Ship Rats (*Rattus rattus*) in Beech Forest in the Eglinton Valley, Fiordland, New Zealand: a Pilot Study. *New Zealand Journal of Zoology*, 32: 139-142.
- Rabinowitz, A. 1997. Wildlife Field Research and Conservation Training Manual. Wildlife Conservation Society, 281p.
- Sinclair, A.R.E., Fryxell, J.M., Caughley, G., 2006. Wildlife Ecology, Conservation & Management. Second Edition. Blackwell Publishing, 469p.
- Wilson, E.O. 1999. The diversity of life. Harvard university press. 424p.
- Wilson, J.D.; M.G. Efford; S.J. Brown; J.F. Williamson and G.J. McElrea. 2007. Estimating Density of Ship Rats in New Zealand Forests by Capture- mark- recapture Trapping. *New Zealand journal of Ecology*, 31(1): 47-59.
- Zehzad, B. & H. Madjnoonian.1998. Hara Protected Area (Biosphere Reserve). Department of the Environment & Shahid Beheshti University Research Bureau. 70 p.



## Population and density estimate of Black Rat (*Rattus rattus*) in Mangrove Forests in Hara Biosphere Reserve - Hormozgan Province

T. Ghadirian<sup>\*1</sup>, M. Karami<sup>2</sup>, A. Danehkar<sup>3</sup>, M. R. Hemami<sup>4</sup>

1- M.Sc. graduated in biodiversity, Science and Research Branch, Islamic Azad University, I.R. Iran

2- Professor, University of Tehran, Faculty of Natural Resources, I.R. Iran

3-Associate professor, University of Tehran, Faculty of Natural Resources, I.R. Iran

4-Assistant professor, Department of Natural Resources, Isfahan University of Technology, I.R. Iran

(Received:8/Nov./2009 , Accepted: 6/May/2010)

### Abstract

Population and density estimate of Black Rat in Mangrove forests was conducted by two independent procedures, including Seber-Jolly and Catch-Effort Methods. A selected trapping area with 15 hectares was studied. First, 60 cage traps for Seber-Jolly and then 80 cage traps for Catch-Effort method installed in the trapping area. We used color earrings and numerical rings for marking the captured individuals. Seber-Jolly method was performed in seven steps which population was estimated 68.5, 96.9, 105.8, 61.7 and 73.6 with densities of 4.1 to seven Rats/ha for steps two to six respectively. Catch-Effort method performed in six steps and population estimate was 89.3 with densities of 5.9 Rats/ha. For comparing the population estimates with the total population captured in the trapping area, the total number of rats was 96 with density of 6.4 Rats/ha. Considering the results, around 4-7 Black Rats survive in every single hectare of Mangrove forests of the study site, which states low differences between the results of Seber-Jolly, Catch-Effort and total count methods. All of these methods appear to be suitable for population-estimate in this habitat, but Catch-Effort method is the most recommended way to study Black Rats in Mangrove forests, due to lower standard error. Black Rat is an exotic and pest species in this habitat and excluding them for scientific reasons would not damage this ecosystem. The other advantages of the Catch-Effort method is its low-cost and efficiency, which could lead us to a total population estimate of the area.

**Key words:** Black Rat, *Rattus rattus*, Mangrove forest, Population estimate, Density, Seber-Jolly, Catch-Effort

\*Corresponding author:

Tel:+982612245909

Fax: +982612245908

Email: t.ghadirian@gmail.com