

## Distribution and conservation of *Sciurus anomalus* in Syria (Rodentia: Sciuridae)

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**Abstract.** The current distribution of the Persian squirrel (*Sciurus anomalus*) in Syria is described based on recent observations. The species distribution extends along the coastal mountains from the vicinity of Kasab in the extreme northwest of the country, along the mountains of Lattakia and Tartus, reaching the vicinity of Damascus in the southwest, with the highest situated records from the Tartus area. Threats including hunting, trading, habitat degradation, and conflicts with local people are outlined.

**Key words.** *Sciurus anomalus*, Syria, distribution, biology, threats.

### INTRODUCTION

The Persian squirrel, *Sciurus anomalus* Gueldenstaedt, 1785, is the only representative of family Sciuridae in the Middle East (KOPROWSKI et al. 2016). The ecology of this species was studied in detail in Jordan and Lebanon (AMR et al. 2006, ABI-SAID et al. 2014). In Syria, the species was mentioned from Mount Hermon and from wooded areas near Damascus (TRISTRAM 1866, HARRISON & BATES 1991, GAVISH 1993, SHEHAB et al. 2018). Other records come from northern Syria including Kastel Maaf, Slenfeh, and Furlunlok Forest (VON LEHMANN 1965).

Within its range of distribution, three subspecies of the Persian squirrel have been recognized; *Sciurus anomalus anomalus* Gueldenstaedt, 1785 distributed in the Caucasus and Turkey, *S. a. pallescens* Gray, 1867 in Iraq and Iran, and *S. a. syriacus* Ehrenberg, 1829 in Syria, Lebanon, Jordan, and Palestine (KOPROWSKI et al. 2016). This division is based on the differences in pelage colouration; *Sciurus anomalus syriacus* is described to have a dark dorsal pelage and generally dark tail and feet, *S. a. anomalus* a deep red tail, and *S. a. pallescens* to possess a pale back and feet, and a yellowish brown tail (HARRISON & BATES 1991, AMR et al. 2006). However, the validity of these subspecies has been discussed (KRYŠTUFEK & VOHRALÍK 2005, GRIMMBERGER & RUDLOFF 2009)

In this communication, we document the distribution of the Persian squirrel in Syria and identify the current threats affecting its populations.

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## RESULTS AND DISCUSSION

### Distribution

We have collected sightings from 83 localities (Table 1) based on our fieldwork and published observations available in the social media. The range of *Sciurus anomalus* extends along the Syrian mountains, continues to cedar, oak or pine forests in Lebanon (ABI-SAID et al. 2014), reaching as far south as the Dibbeen Nature Reserve in northern Jordan (AMR et al. 2006). The species has not been recently recorded from Palestine (MENDELSSOHN & YOM-TOV 1999).

In Syria, the distribution of *Sciurus anomalus* extends along the coastal mountains from the vicinity of Kasab in the extreme northwest, along the mountains of Lattakia and Tartus, reaching the vicinity of Damascus in the southwest (Fig. 1). The highest records are available from the

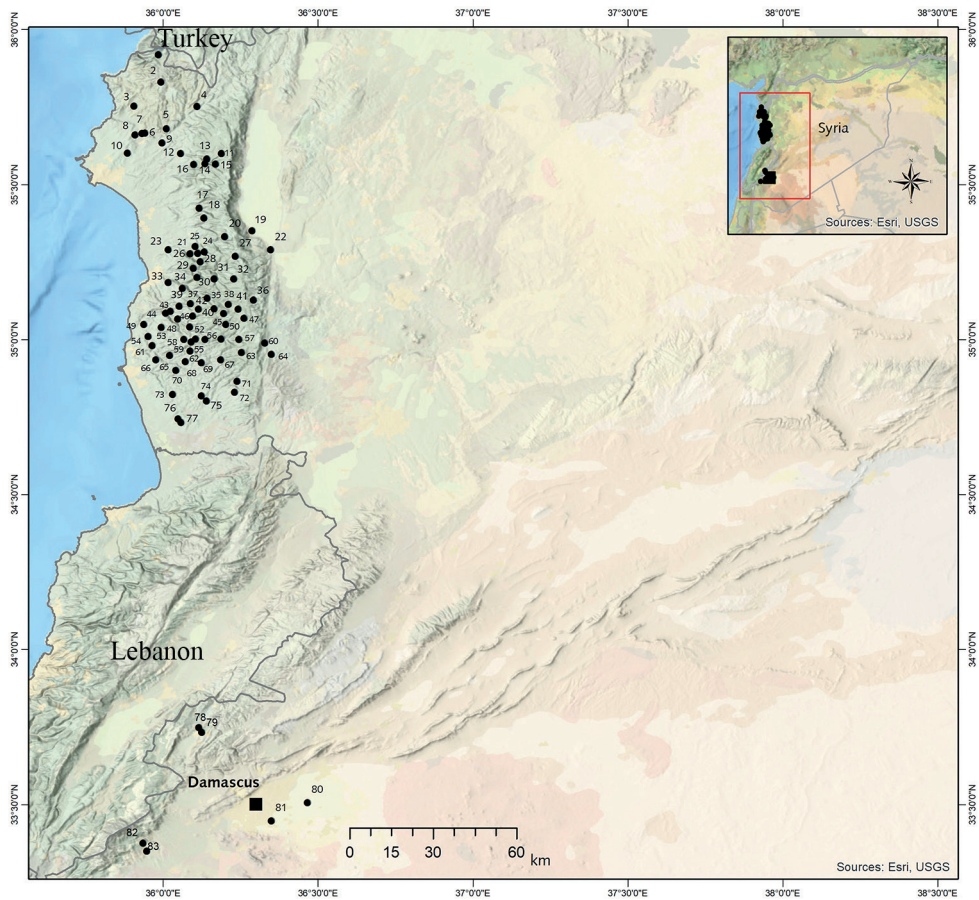


Fig. 1. Distribution of the Persian squirrel (*Sciurus anomalus*) in Syria (locality numbers correspond with Table 1).

Table 1. Localities from which the Persian squirrel (*Sciurus anomalus*) was reported and observed in Syria

No.	locality	°N	°E	No.	locality	°N	°E
1	Kasab, vicinity	35.9187	35.9843	43	Beit Khoundah	35.0909	36.0237
2	Al Furunlok	35.8306	35.9935	44	Sreijes	35.0846	36.0085
3	Balluran	35.7535	35.9057	45	Al Mqarmdeh	35.0835	36.1952
4	Obeen	35.7522	36.1091	46	Hamam Wasil	35.0761	36.0949
5	Ghmam	35.6799	36.0109	47	Al Sheeha	35.0684	36.2608
6	Mashqita Lake	35.6662	35.9413	48	Al Kreem	35.0665	36.0471
7	Qarajaleh	35.6648	35.9322	49	Kaff Al Hamam	35.0492	35.9382
8	Mashqita	35.6603	35.9089	50	Hammam Qenieh	35.0488	36.2020
9	Az Zoubar	35.6347	35.9970	51	Qal'at Al Kahf	35.0410	36.0854
10	Ein Al Laban	35.6012	35.8846	52	Al Qumsiyah	35.0391	35.9937
11	Slenfeh	35.6003	36.1879	53	Al Hanafeiah	35.0093	35.9515
12	Al Shardoub Forest	35.5999	36.0567	54	Breiseen	35.0022	36.1046
13	Darious	35.5824	36.1409	55	Wadi Al Uyun	35.0017	36.1865
14	Basta	35.5680	36.1354	56	Nabi Jaber	35.0003	36.2449
15	Beshmana	35.5659	36.1697	57	Binjarah	35.0000	36.1355
16	Ein Al Teineh	35.5646	36.0989	58	Abo Minqar	35.0000	36.0667
17	Bakrama	35.4241	36.1159	59	Ash Shaykh Badr	34.9927	36.0909
18	Harf Al Mseifrah	35.3925	36.1323	60	Al Meshrefeh	34.9883	36.3277
19	Ein Elkorum	35.3514	36.2866	61	Ra's Kettan	34.9808	35.9648
20	Al Mneizleh	35.3326	36.1992	62	Beit Al Maysarah	34.9632	36.0873
21	Beshraghi	35.3002	36.1038	63	Nabi Matta	34.9580	36.2534
22	Nahr Al Bared	35.2897	36.3469	64	B'amra	34.9518	36.3500
23	Al Qteilibiyah	35.2893	36.0167	65	Kherbat Al Faras	34.9484	36.0207
24	Pshileh	35.2833	36.1333	66	Bmlakah	34.9342	35.9766
25	Psendiana	35.2776	36.1117	67	Sreighes	34.9340	36.1864
26	Jaiboul	35.2768	36.0869	68	Baq'uo	34.9291	36.0723
27	Abu Qubays	35.2690	36.2330	69	Jneinat Raslan	34.9257	36.1233
28	Beet A'na	35.2509	36.1194	70	Himein	34.9008	36.0412
29	Wadi Al Qal'e	35.2296	36.0979	71	Kafroun	34.8656	36.2391
30	Ad Derdarah	35.2005	36.1096	72	Al Barqiyah	34.8298	36.2300
31	Qal'at Al'ulayqah	35.1962	36.1650	73	Al Keshfeh	34.8234	36.0305
32	Blouseen	35.1957	36.2284	74	Safita	34.8189	36.1230
33	Al Dreikyiah	35.1838	36.0168	75	Al Mandarah	34.8021	36.1397
34	Esqebleh	35.1654	36.0625	76	Al Areemah	34.7438	36.0477
35	Al Duwaylia	35.1330	36.1429	77	As Sifsafeh	34.7322	36.0578
36	Al Heiluna	35.1272	36.2921	78	Zabadani	33.7477	36.1148
37	Al Smeihyqah	35.1163	36.0883	79	Bloudan	33.7321	36.1251
38	Al Hatryiah	35.1136	36.2108	80	Kharabow	33.5055	36.4655
39	T'aneita	35.1070	36.0515	81	Sayyidah Zaynab	33.4465	36.3488
40	Al Kadmous	35.0991	36.1642	82	Ein Al Sha'ara	33.3741	35.9355
41	Al Qadhoun	35.0979	36.2420	83	Heineh	33.3487	35.9465
42	Karm Al Teen	35.0975	36.1135				

Tartus area. The arid regions around Homs extending to the south near Damascus are void of natural forests. Populations of the Persian squirrel start to appear west of Damascus, where the natural oak forests in Zabadani and Bloudan close to the border between Syria and Lebanon

are abundant. Small populations were reported east of Damascus in the Ghotia area, and from Mount Hermon, mainly in an agricultural area with fruit and walnut trees.

### H a b i t a t

The Persian squirrel is associated with oak (*Quercus coccifera* and *Quercus calliprinos*), pine (*Pinus brutia* and *Pinus halepensis*), hawthorn (*Crataegus* sp.), bay tree (*Laurus nobilis*), and cedar (*Cedrus libani*) forests. Most of the natural forests in Syria are located along the coastal mountains with an estimated area of 2,576 km<sup>2</sup>, mostly dominated by *Quercus calliprinos* and *Quercus infectoria*, and associated with *Crataegus azarolus*, *Laurus nobilis*, *Prunus ursine*, and *Pyrus syriaca*. Pine forests of *Pinus brutia* are found around the Lattakia area. Cedar forests are located at higher altitudes ranging between 900–1560 m a. s. l., associated with the Cilician fir (*Abies cilicica*).

The natural forests in Syria are mainly concentrated around the coastal areas of Lattakia and Tartus, and in the inland near Hama, rural areas of Damascus and Idleb, accounting for about 81% of the total forest area (MOHAMED et al. 2020).

*Sciurus anomalus* takes refuge in dense forests, especially oak, and frequent farms to feed on walnut trees and others (Figs. 2, 3). They are usually observed either on the ground searching for food or feeding on grasses, or in trees, hiding or feeding on fresh green pine cones growing



Fig. 2. A forest near Al Qadhoun in northern Syria with oak trees.



Fig. 3. Persian squirrels observed in Syria. A – Beshraghi (photo by I. SALEH). B – Jaiboul (photo by H. AL KHATIB). C – Slenfeh (photo by T. ISMAIEL). D – Al Qteilibiyah (photo by H. AL HAKEEM).

on the tree tops. Nests are usually located in holes of oak trees with one opening several metres above ground (Fig. 4).

The Persian squirrel feeds on oak acorns as well as pine cones. Remains of the eaten fresh pine cones are found scattered on the forest floor, while oak acorns are usually found in tree holes used as a nest. Only individual squirrels were observed in most cases, however, one of us (AA) came across ten and twenty individuals either individually or in pairs near Abu Qubays and in a small forest near Mashqita in 2008, respectively, both with dense oak and pine forests. In some cases, squirrels were sighted near houses with cultivated trees.

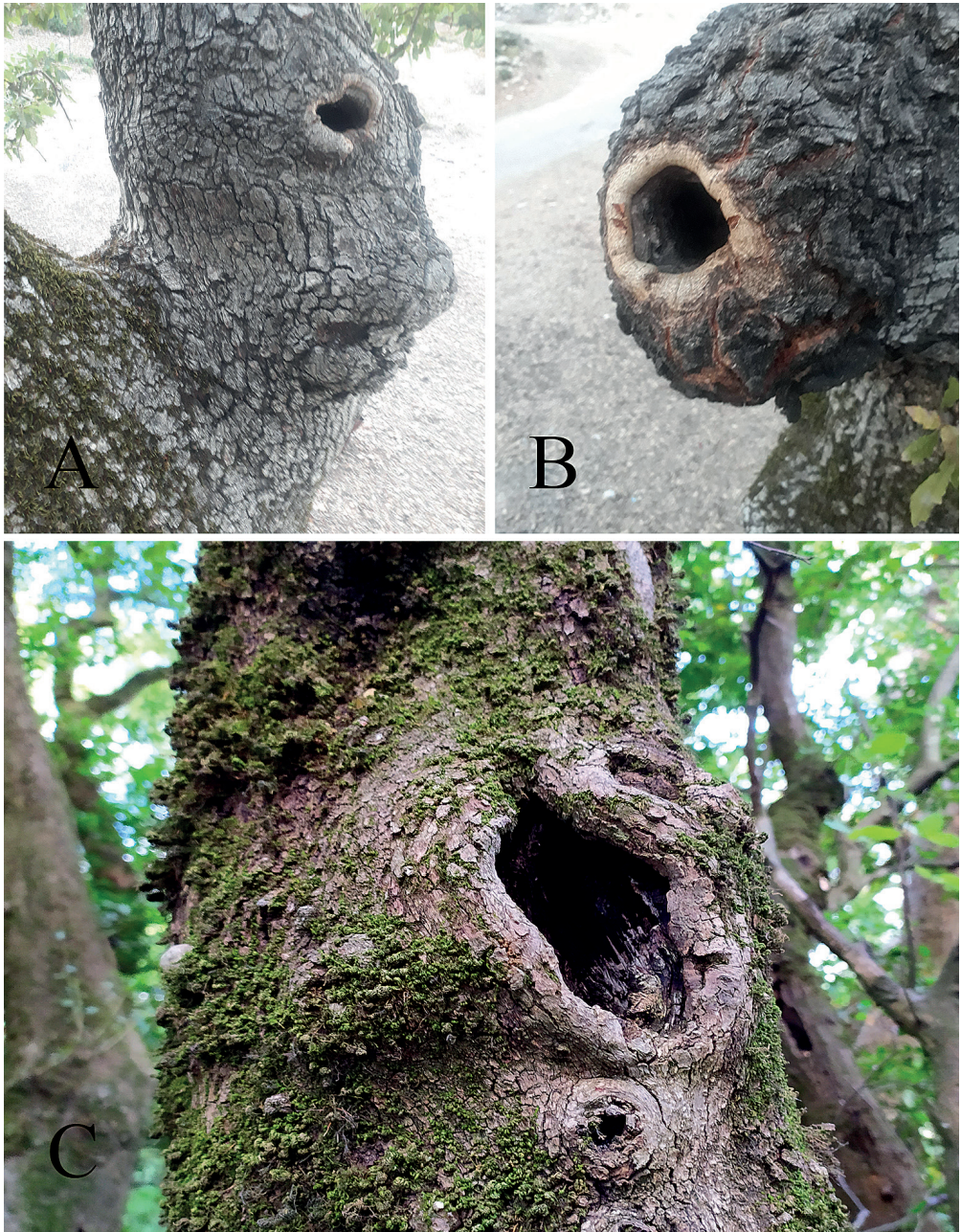


Fig. 4. Persian squirrel's nests in tree holes of oak forests in Al Kadmous (photo by A. HAEDAR & M. AL-ALI).



Fig. 5. Caged Persian squirrel offered for sale in a local market.

## Reproduction

There are two seasons for the birth of squirrels in Syria. The main season is in the spring and lasts from late March until early May, and the other season is in the autumn and extends from the end of October until early November. Nesting generally occurs in hollows of oak trees, sometimes the parents build a high nest on pine trees, and when there is no suitable place for nesting, squirrels nest in rocky cliffs. In Greece, breeding occurs from April to May and August to September (HECHT-MARKOU 1994), while in Transcaucasia, the breeding season lasts from early February to April, and then during mid-July to late August (OGNEV 1966, HECHT-MARKOU 1994).

## Threats and human interaction

There is a conflict with the local people in the majority of areas where the Persian squirrel was observed. Squirrels feed on walnut and almond plantations. In addition, they consume pomegranates, figs, and other crops. These crops are considered very valuable for farmers with a high market price. Squirrels are thus regarded as agricultural pests, and as a result, they are killed in several ways (i.e. shooting, trapping, and poisoning) to avoid economic loss. Sometimes the squirrels are killed indirectly by traps that are placed for other animals, and they are also attached to traps that contain adhesive materials used for bird hunting, in addition to nets that are set for bird hunting.

On the other hand, wildlife trade is currently flourishing in Syria as a result of poor enforcement of wildlife laws for the protection of wildlife and their trade enacted in 1970. Young squirrels are caught and offered for sale in cages at markets in Damascus, Lattakia, and Tartus. Squirrel hunters dig into the tree just below the squirrel's nest hole, making a new hole, shortly after the birth of the young, they uncover the thin crust between the nest hole and the new hole they made, then capturing the young individuals. The animals are kept in cramped cages and under poor sanitary conditions (Fig. 5). They are sold for about \$20 each. Also, in some instances, squirrels are smuggled to Lebanon and Jordan for sale.

On the other hand, squirrels are killed by hunters without any justification, since hunting in Syria has turned from a hobby to extermination of wildlife. Squirrels are not consumed by the locals or prescribed for folk medicine. Captured animals are kept in cages as pets, however they do not survive and die soon after. Some others are sold as mummified animals.

The stone marten, *Martes foina* (Erxleben, 1777), is one of the natural enemies preying on young squirrels. The stone marten was observed on several occasions to attack squirrel nests and devour the young.

Deforestation has increased over the years through acquisition of land for agriculture, logging to produce fuelwood and charcoal, and urbanization especially in the mountains. Forest fires are not a direct result of war, but rather caused by natural or intentional causes. Sometimes the fire spreads in forests during charcoal making or when farmers burn their crop residues.

## C o n c l u s i o n s

This preliminary study sheds light on the urgent need to investigate the ecology and biology of the Persian squirrel in Syria, and to identify further threats affecting its current population. Other avenues include molecular identification of the current populations in Jordan, Lebanon, and Syria.

## A c k n o w l e d g e m e n t s

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