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**The migration of
Lesser and Greater
Spotted Eagles in
Lebanon**

*Chateau Rweiss, Chnannir – Keserwan,
Lebanon
October 8th, 2019 at 12 am*



The Lesser Spotted Eagle (*Clanga pomarina*) is a long-distance migrant who migrates twice a year at least 10,000 km between the breeding areas and the wintering areas.

The breeding areas lie between Eastern Germany in the northwest, the area around Moscow in the northeast and stretches over Turkey as far as into the South Caspian lowlands in Iran.



Very little was known about the migration and wintering of the species before satellite telemetry started in 1992



Ad. Lesser Spotted Eagle

Foto: B.-U. Meyburg

The four phases of the technical development of satellite telemetry: data shown is for the time period applicable to middle-sized species such as the Lesser Spotted Eagles

DATES	TYPE OF ARGOS TRANSMITTER	COMMENTS
1992 - 1995	Battery-powered PTTs with Doppler locations	Life expectancy of about one year when programmed to send for several hours every few days. Maximum of 100-150 locations.
1996-2003	Solar-powered PTTs with Doppler locations	PTTs with a life expectancy of several years (one case of over 10 years) providing thousands of ARGOS locations per annum when sufficient light available, permitting study of migration.
Since 2004	Solar-powered PTTs with built-in GPS	Locations precise to within a few dozen metres, permitting analysis of behaviour in detail

Since 2012 there are GSM transmitters

Lesser Spotted
Eagle with
30 g GPS
Satellite
Transmitter

Earlier transmitters didn't
have GPS tracking yet,
only from 2004 on.



Photo: B.-U. Meyburg

In 1992 I started to equip the first LSEs with satellite transmitters when they became small and light enough. Since then, the technology has improved incredibly. Current transmitters can deliver up to one GPS location per second. They also provide altitude, speed and direction.

The GSM tags transmit the data via the mobile phone network, which enables the transmission of many more localisations than the Argos satellite system, e.g. 2,650 GPS fixes per month were received in the breeding area from this transmitter.

**GSM transmitters
Since 2012**

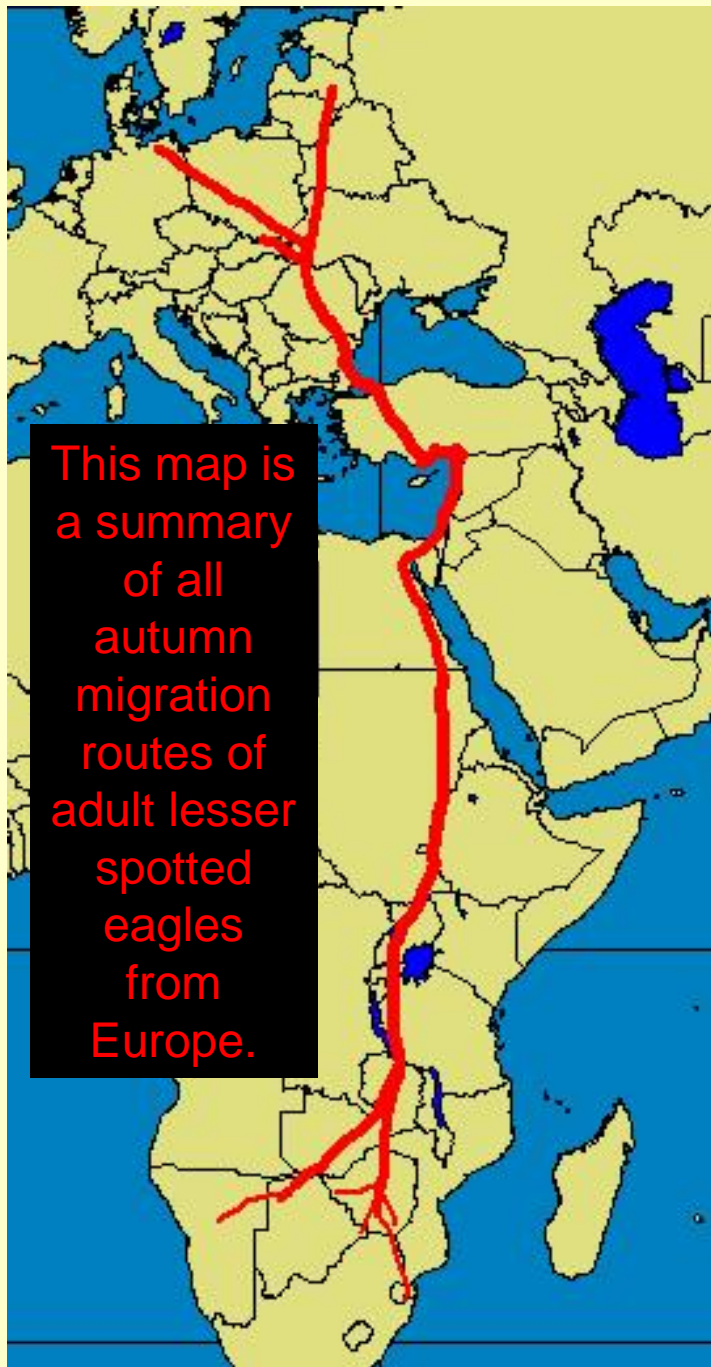


**Most of the
evaluations we
will show here
are from four
adult eagles
with this latest
transmitter type.**

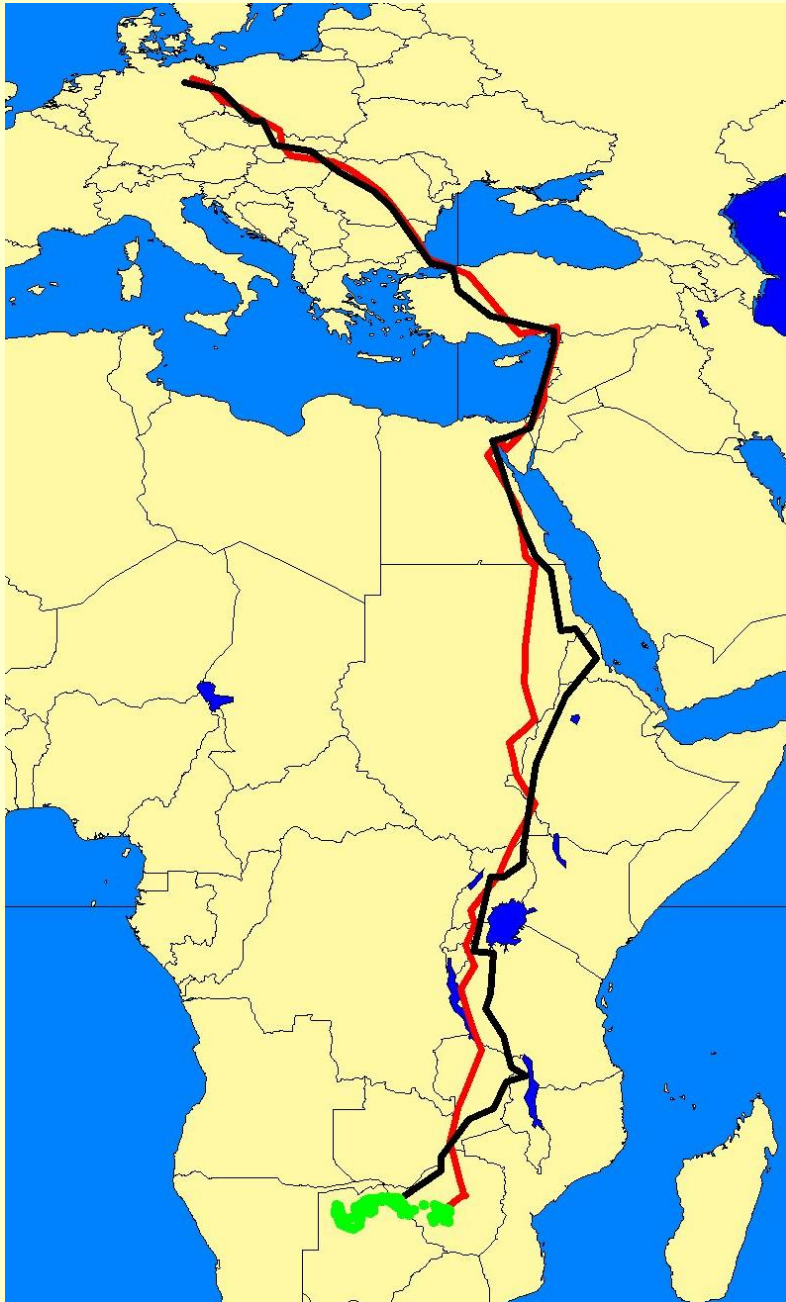
**Ad. male 0024 („Panni“)
with a prototype of a GSM transmitter**



Data transmission via the mobile telephone network represents another quantum leap in this field. GSM is the abbreviation for *Groupe Spéciale Mobile*, a telecommunication standard for digital mobile networks. The employment of this GSM technology has enormous advantages for bird telemetry, in particular a much more secure transmission of data than via the NASA satellites and disproportionately lower costs for data transmission.



The autumn migration route of the adult Lesser Spotted Eagles takes place in narrow front on an "ideal route", with the animals almost exclusively over the Bosphorus and through the Middle East.



Typical autumn (= red) and spring (= black) migration of an adult male (83269) as well as its wintering (= green) in 2008-2009. The bird was breeding slightly north of Berlin and wintered in Botswana and Zimbabwe.

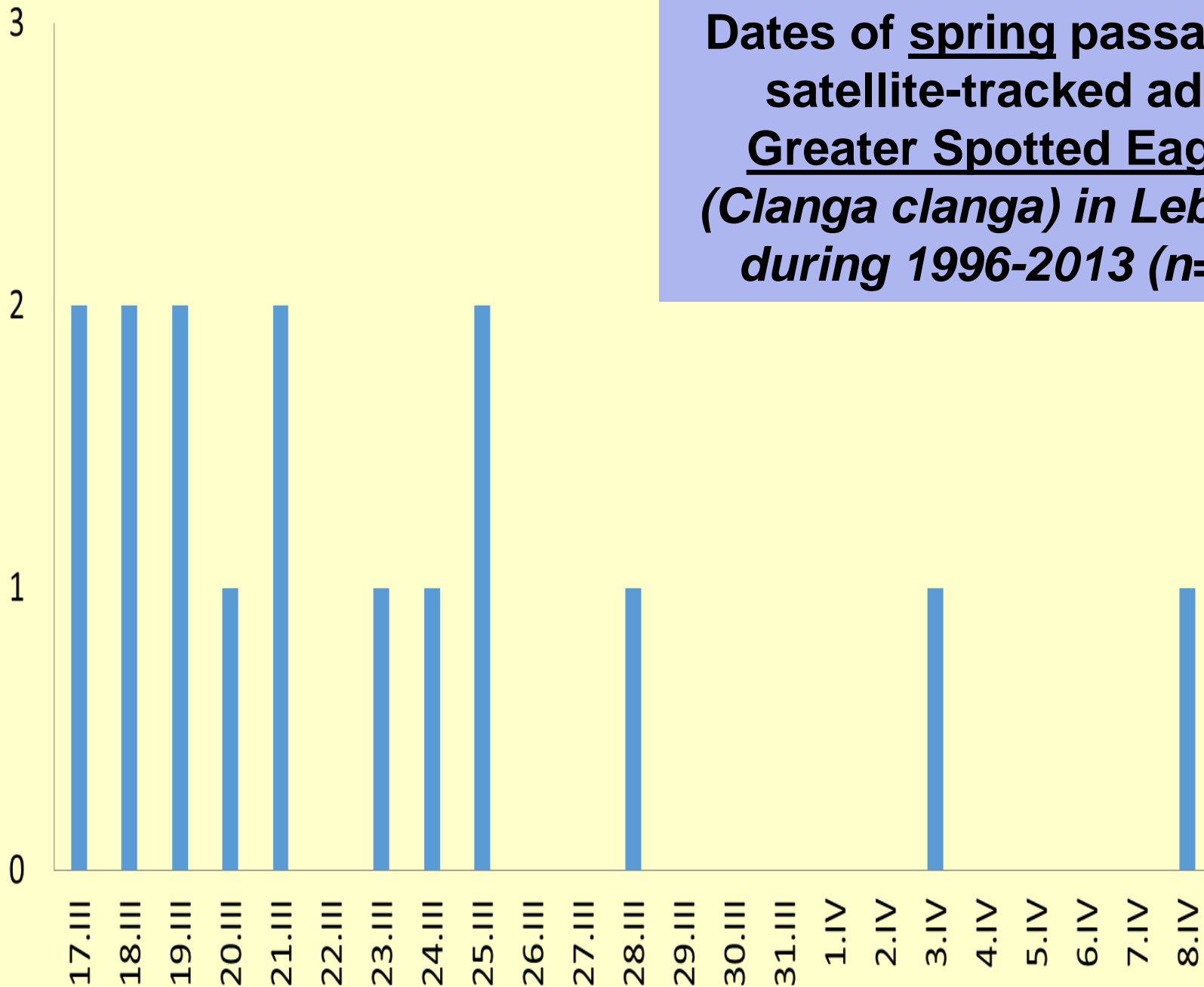


Ad. Greater Spotted Eagle

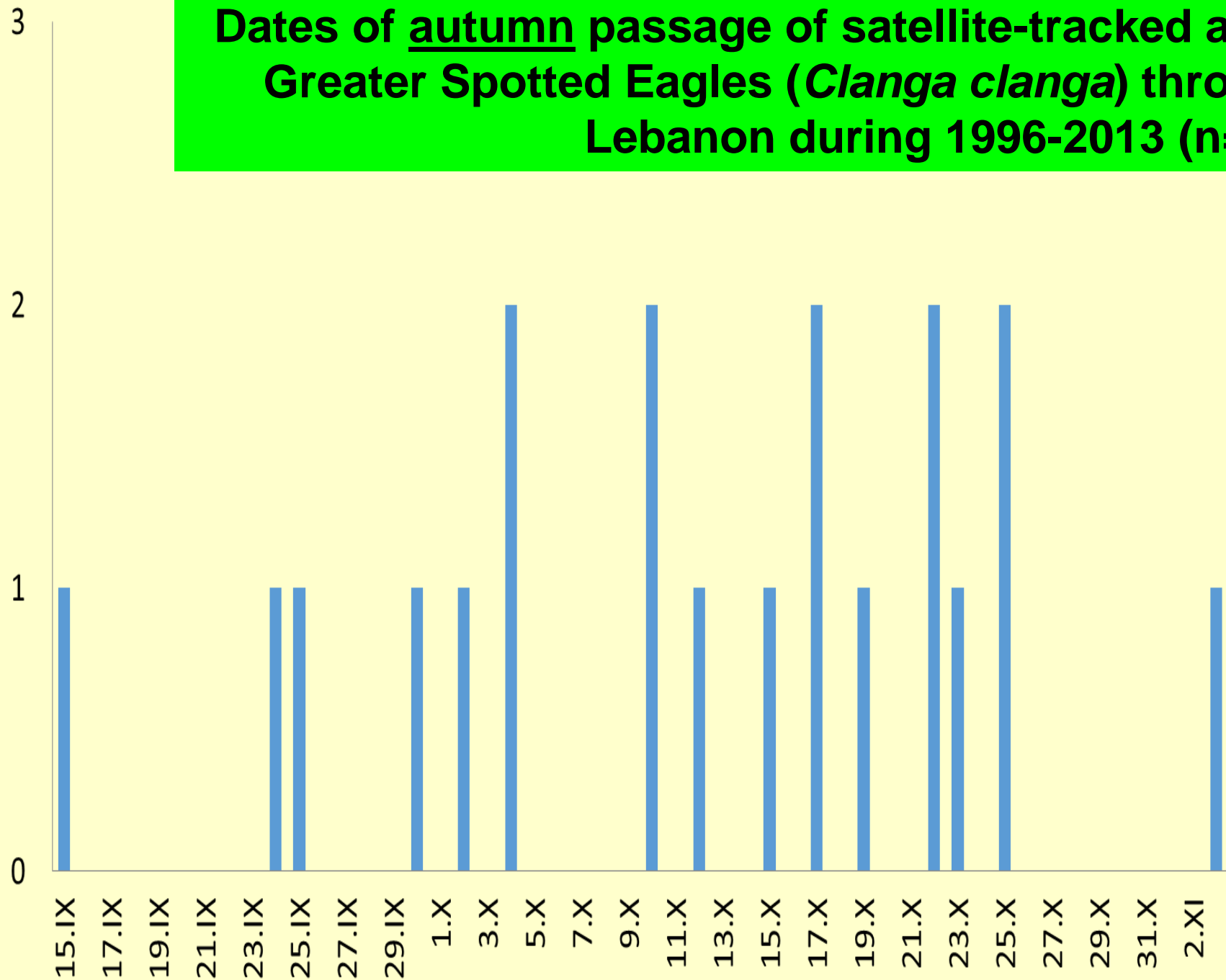
We lost two juveniles Lesser Spotted Eagles in Lebanon already in 1993. One was demonstrably shot down. We received the transmitter with a shot ball in it from a doctor. That is the only certain proof of the shooting in Lebanon. The second transmitter was located in Beirut for months.

In 1994, the first ad. Greater Spotted Eagle, which we succeeded in capturing, was shot down in Lebanon. The breeding site of the rare species in Poland remained occupied only by the male for several years.

**Dates of spring passage of
satellite-tracked adult
Greater Spotted Eagles
(*Clanga clanga*) in Lebanon
during 1996-2013 (n=16)**



**Dates of autumn passage of satellite-tracked adult
Greater Spotted Eagles (*Clanga clanga*) through
Lebanon during 1996-2013 (n=20)**

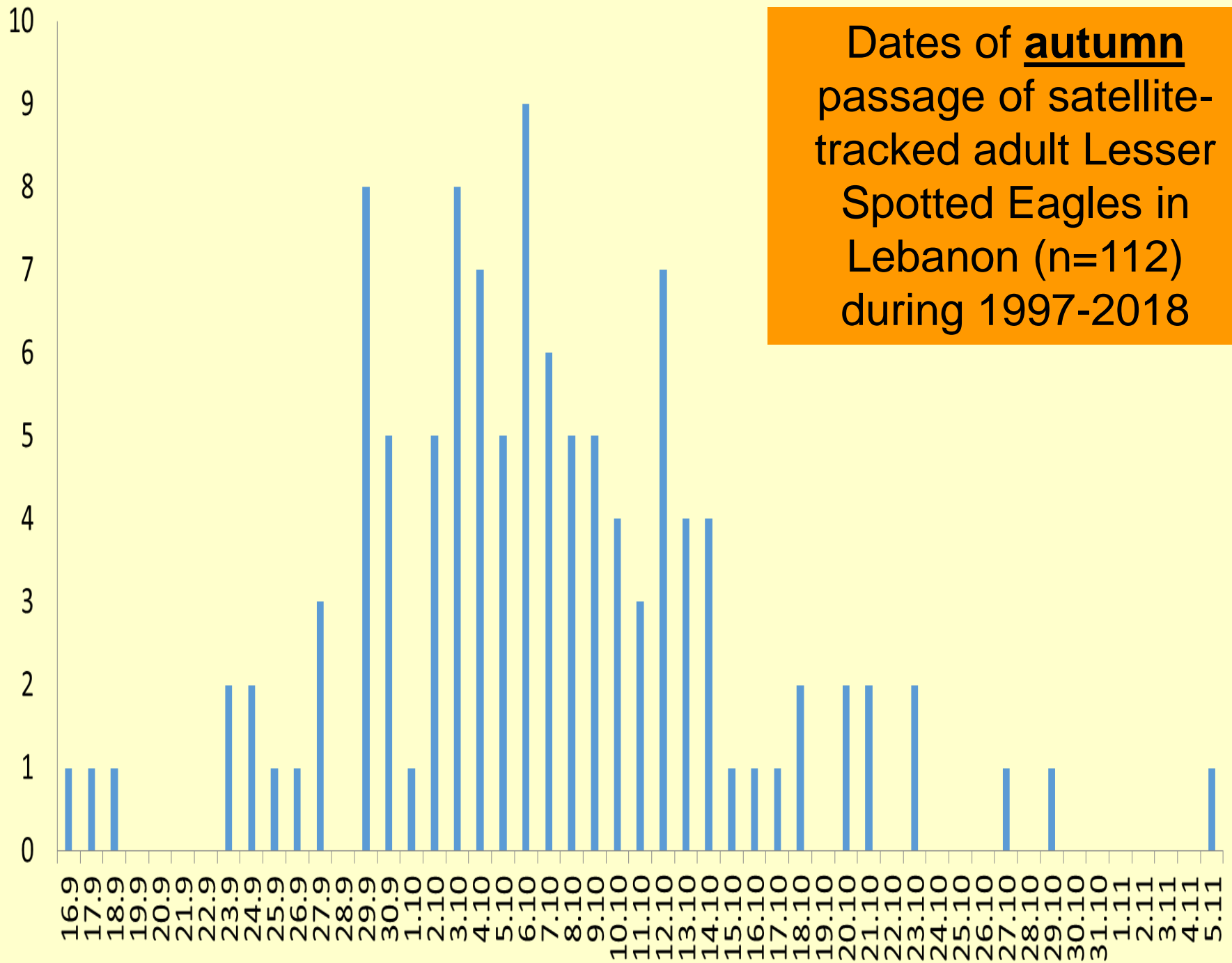




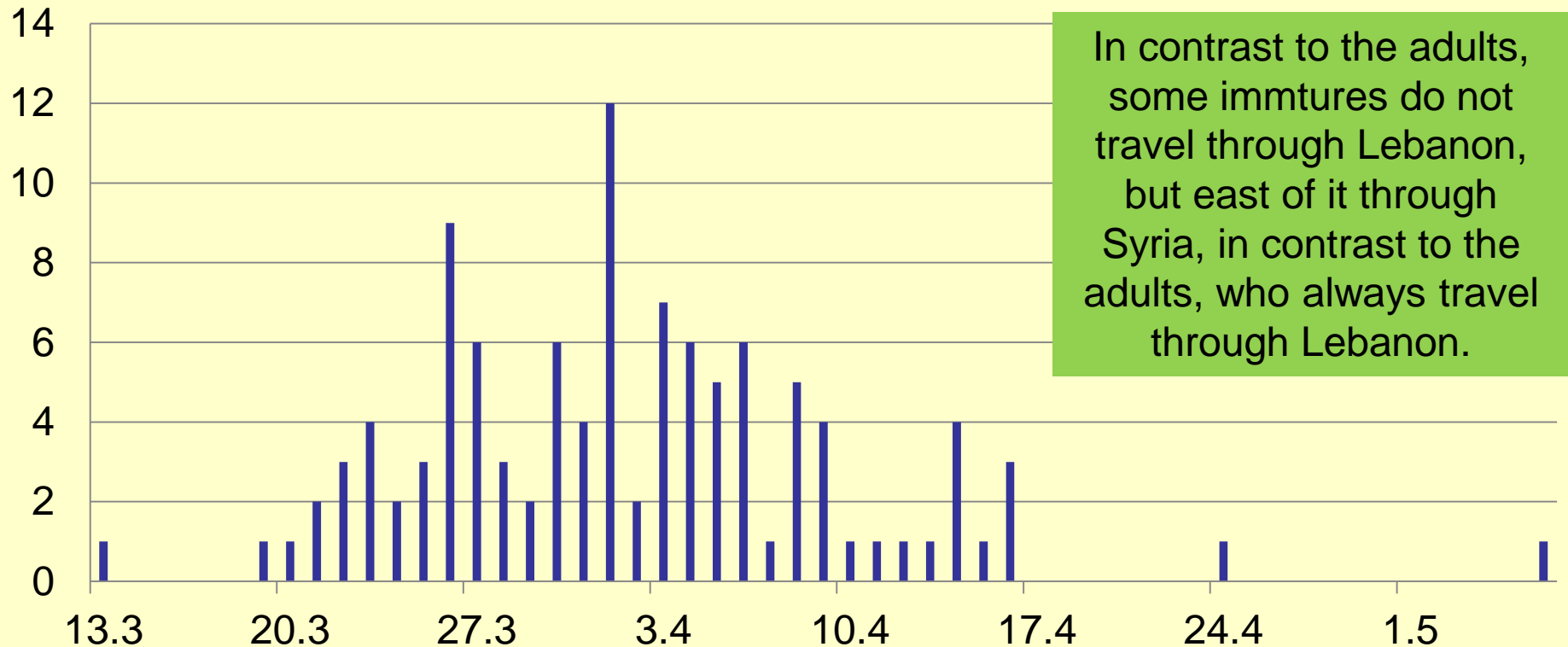
Lesser Spotted Eagle

Since
1992 we
have
satellite
tracked
over
100
Lesser
Spotted
Eagles
Clanga
pomarina

Dates of autumn
passage of satellite-
tracked adult Lesser
Spotted Eagles in
Lebanon (n=112)
during 1997-2018



Dates of spring passage of satellite-tracked adult Lesser Spotted Eagles in Lebanon (n=109) during 1997-2018

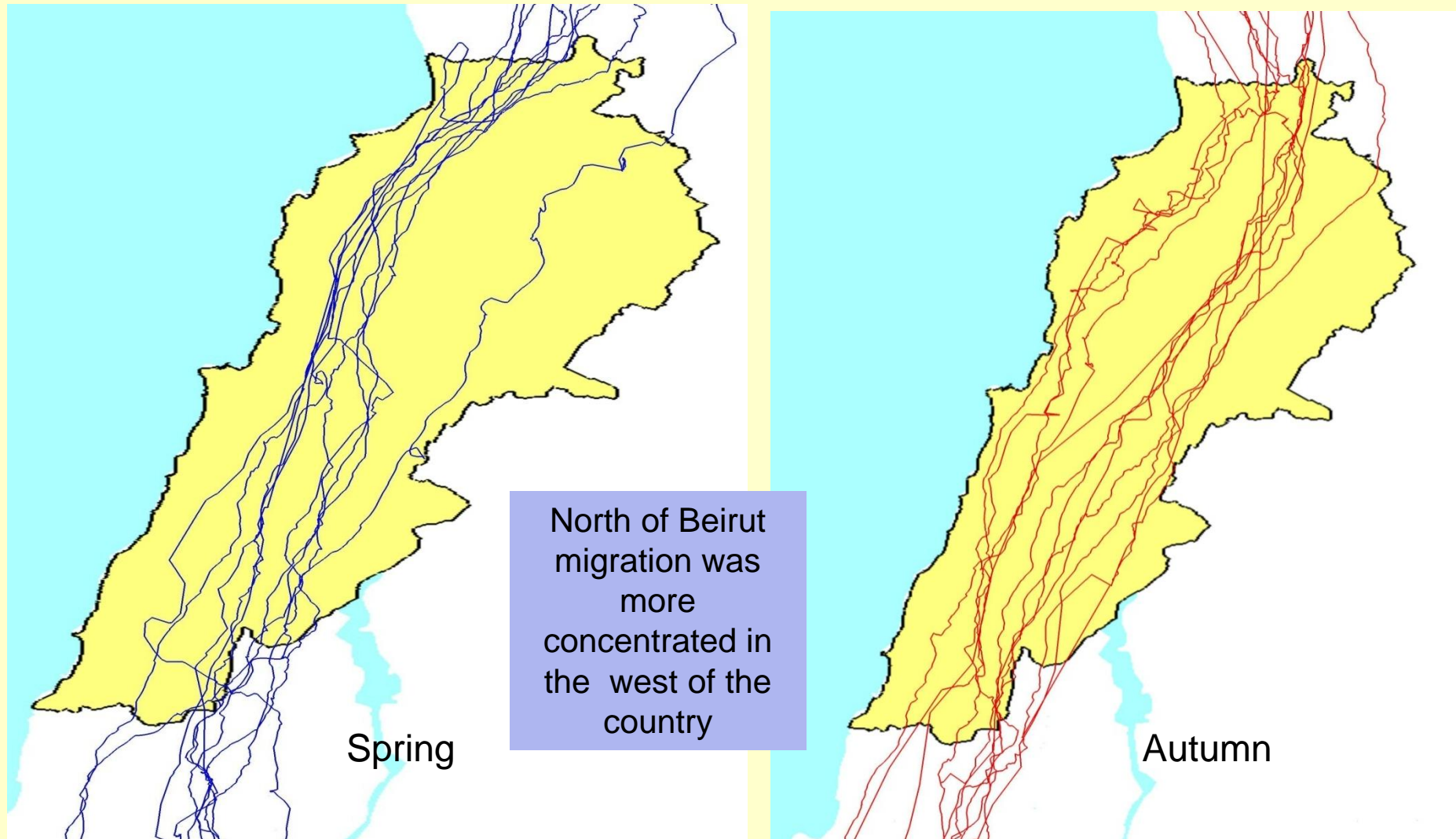


In contrast to the adults, some immatures do not travel through Lebanon, but east of it through Syria, in contrast to the adults, who always travel through Lebanon.

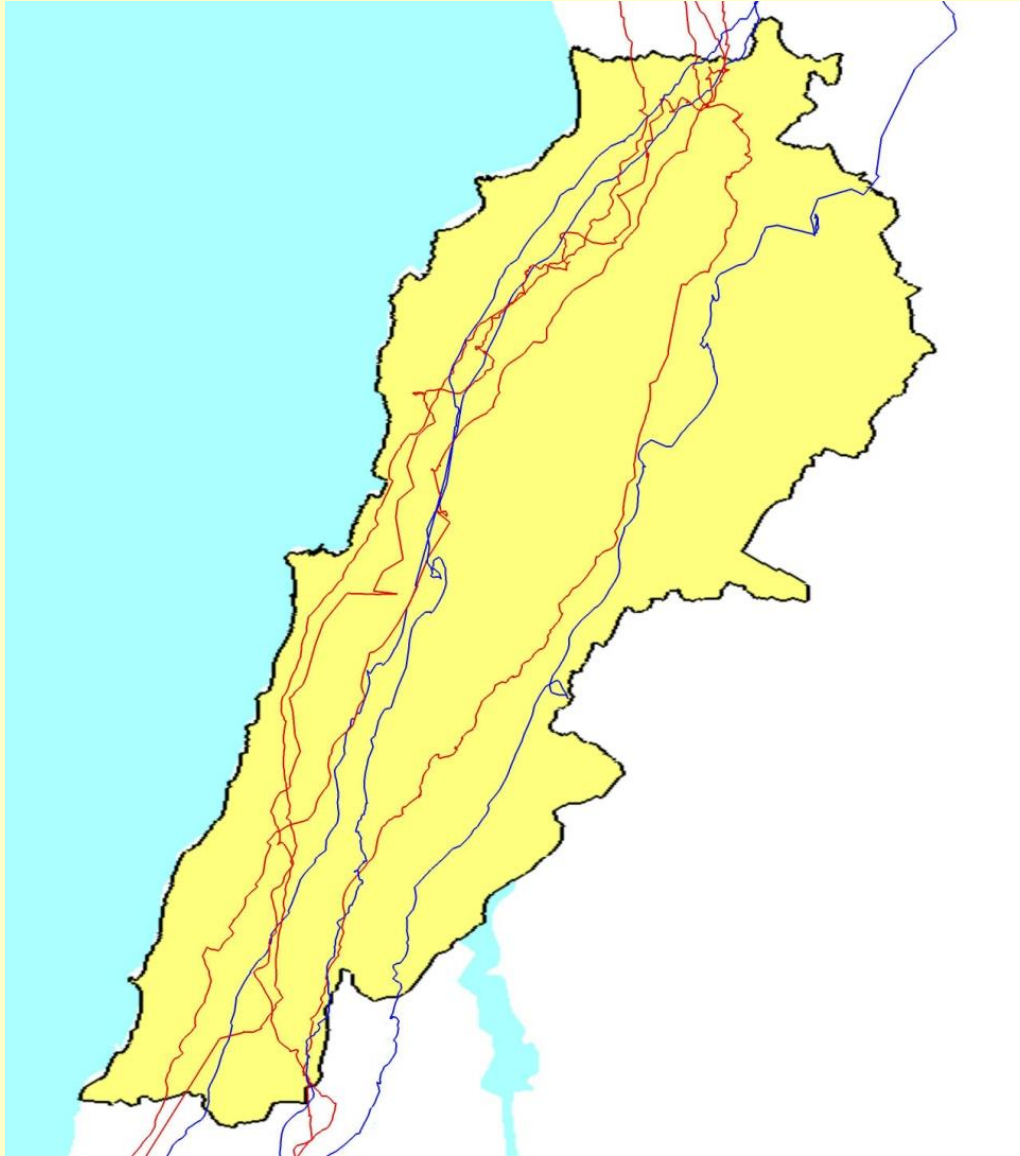
In spring, young eagles migrate later than adult birds, the younger the later. One-year-old eagles can migrate two months later than adults. In the second spring they migrate a little earlier, in the third spring they still migrate a little later than the adults.

Eagles passing east of the Black Sea via Batumi sometimes already leave the main migration route in Israel, sometimes only after arriving in Turkey, and vice versa in autumn.

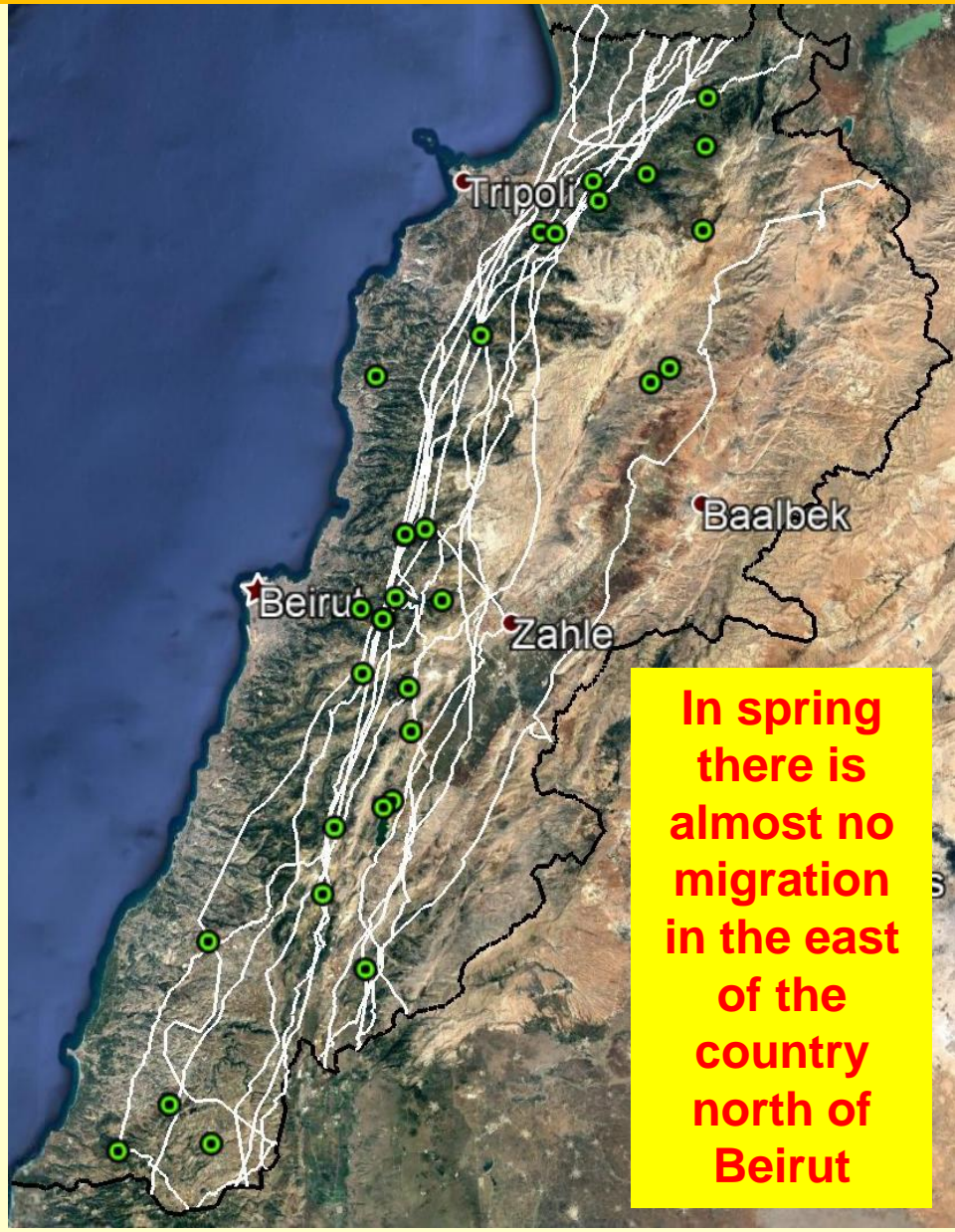
Migration routes of four ad. Lesser Spotted Eagle marked with GSM-GPS transmitters in Lebanon during several years



Lesser Spotted Eagle take different routes (red = autumn, blue = spring) from year to year. Here the routes of an adult male (0220) which disappeared in Zambia during its last wintering.



Autumn (left) and spring (right) migration routes (n=23) of four adult Lesser Spotted Eagles with GSM-GPS transmitters and the roost sites (n=83) of 25 adults with GPS tags in different years



**In spring
there is
almost no
migration
in the east
of the
country
north of
Beirut**

During autumn migration the birds with GSM tags covered an average distance of 214 km (range: 155-272 km) per day migrating through Lebanon



They took 21h 36min (range: 5h 18min – 45h 22min) to cross the country including overnight-roosts.

Excluding the time spent at night roosts they spent 7h 59min (range: 5h 9min – 16h 16min) flying on average to cross the Lebanon. The average speed was 29.1 km/h (range: 17-40.2 km/h).

**Migration
was slightly
faster in
spring than
in autumn.**



**During spring migration
the daily distance
covered was 208 km on
average distance
(range: 183-276 km).**

**17h 01min (range: 3h
34min – 23h 31min) was
needed to cross
Lebanon. This included
overnight-roosts.**

**The average time spent
on the wing excluding
roosting amounted to 5h
57min (range: 3h 34min
– 7h 36min).**

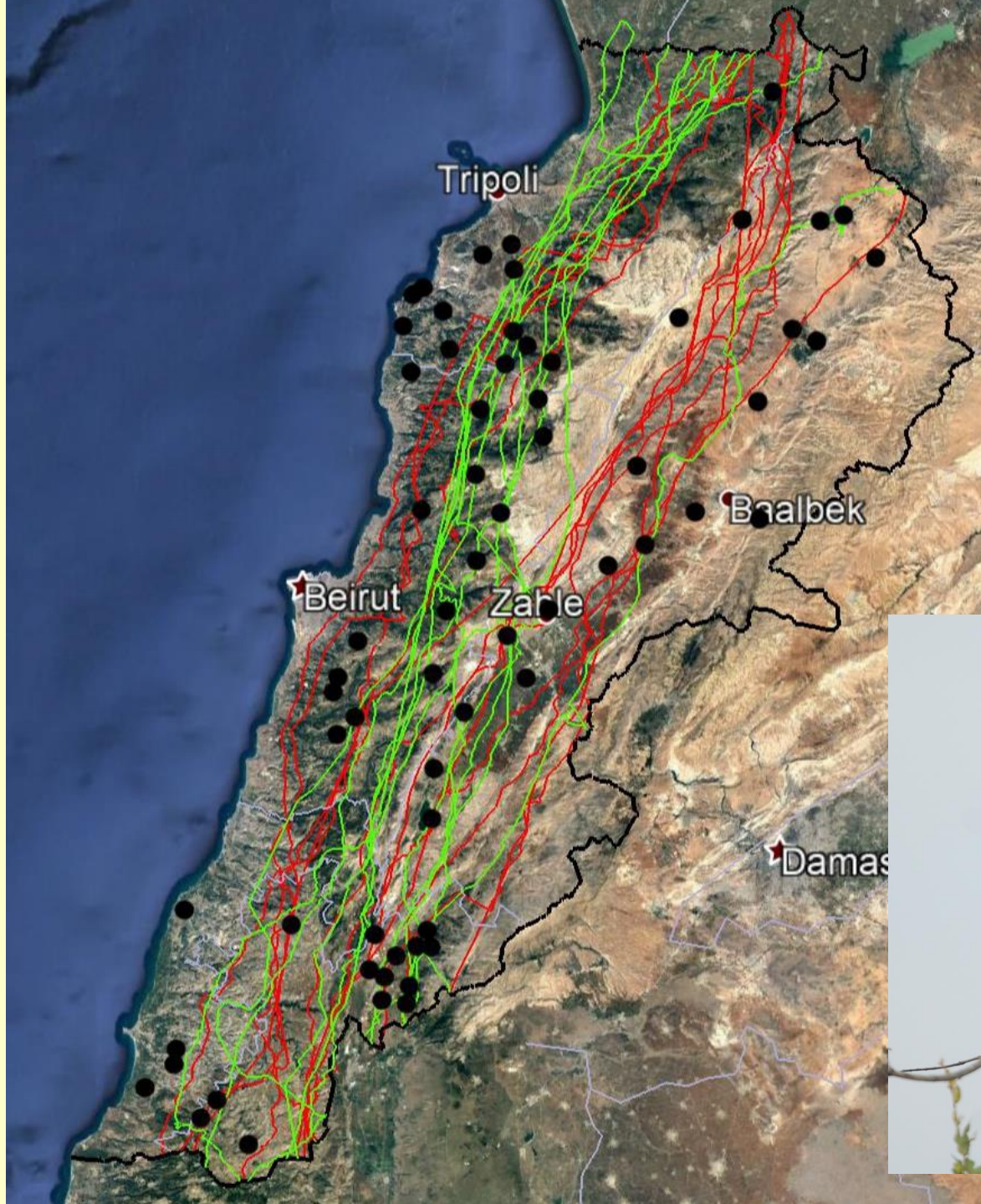
**The average speed was
36.3 km/h (range: 27.6-
51.9 km/h).**



For many European migratory bird species that fly around the eastern Mediterranean to reach Africa, the section between Turkey and Egypt is particularly dangerous due to human persecution.

Massive persecution has been described already long time ago mainly from Lebanon (LESHEM 1985, WOLDEK 1980), but also from Syria (BAUMGART 1991).

This applies in particular to the Lesser Spotted Eagle (MEYBURG et al. 1995, DANKO et al. 1996).



**Hunting hotspots
(n=65) in Lebanon
(black dots- data
from SPNL) and
Lesser Spotted
Eagle migration in
autumn (red) and
spring (green)**





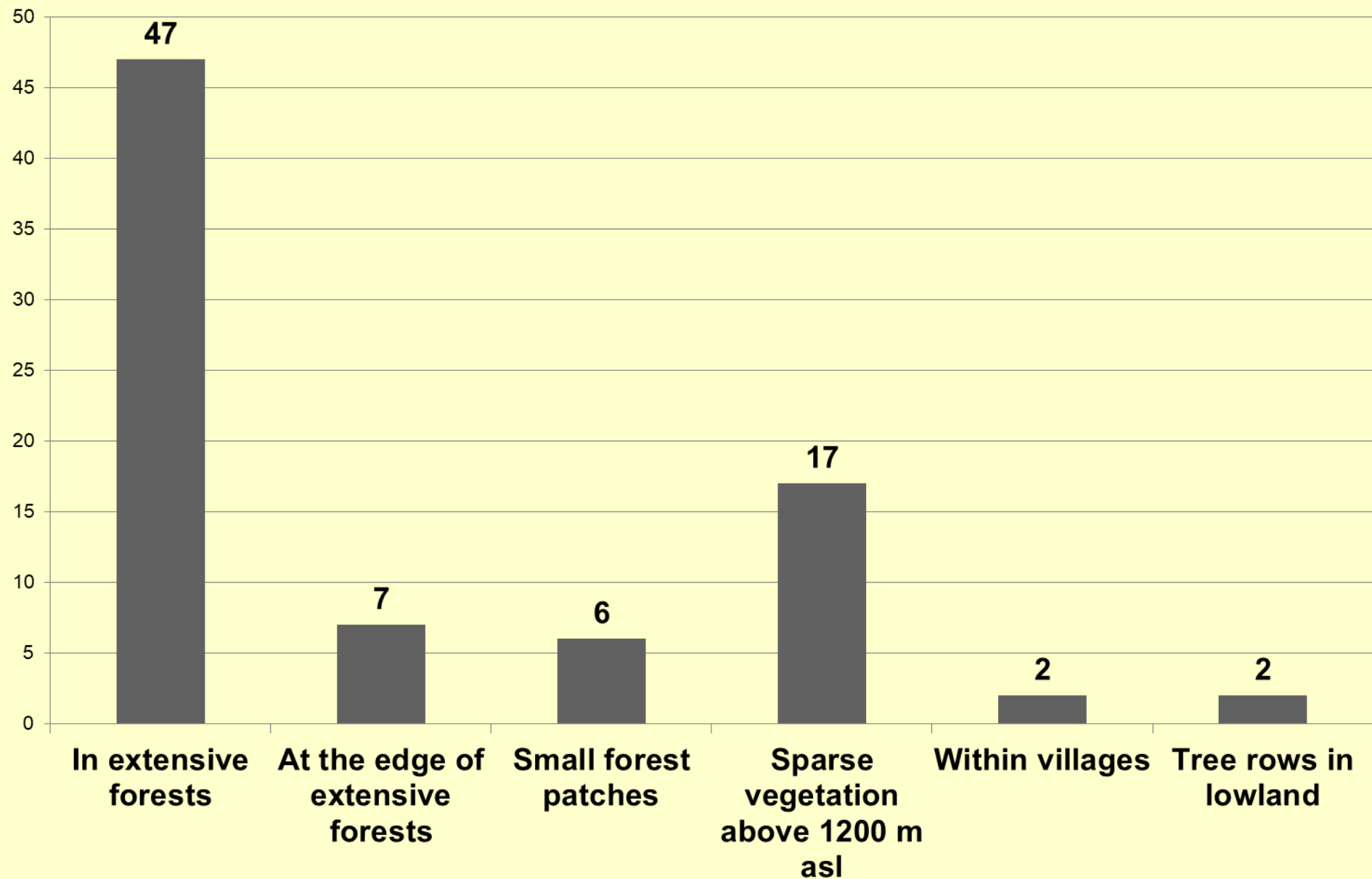
Photo: B.-U. Meyburg

We assume that the eagles are most threatened at the overnight roosting places, likewise, if they fly low, e.g. in the early morning before they gain enough height by stronger thermals.

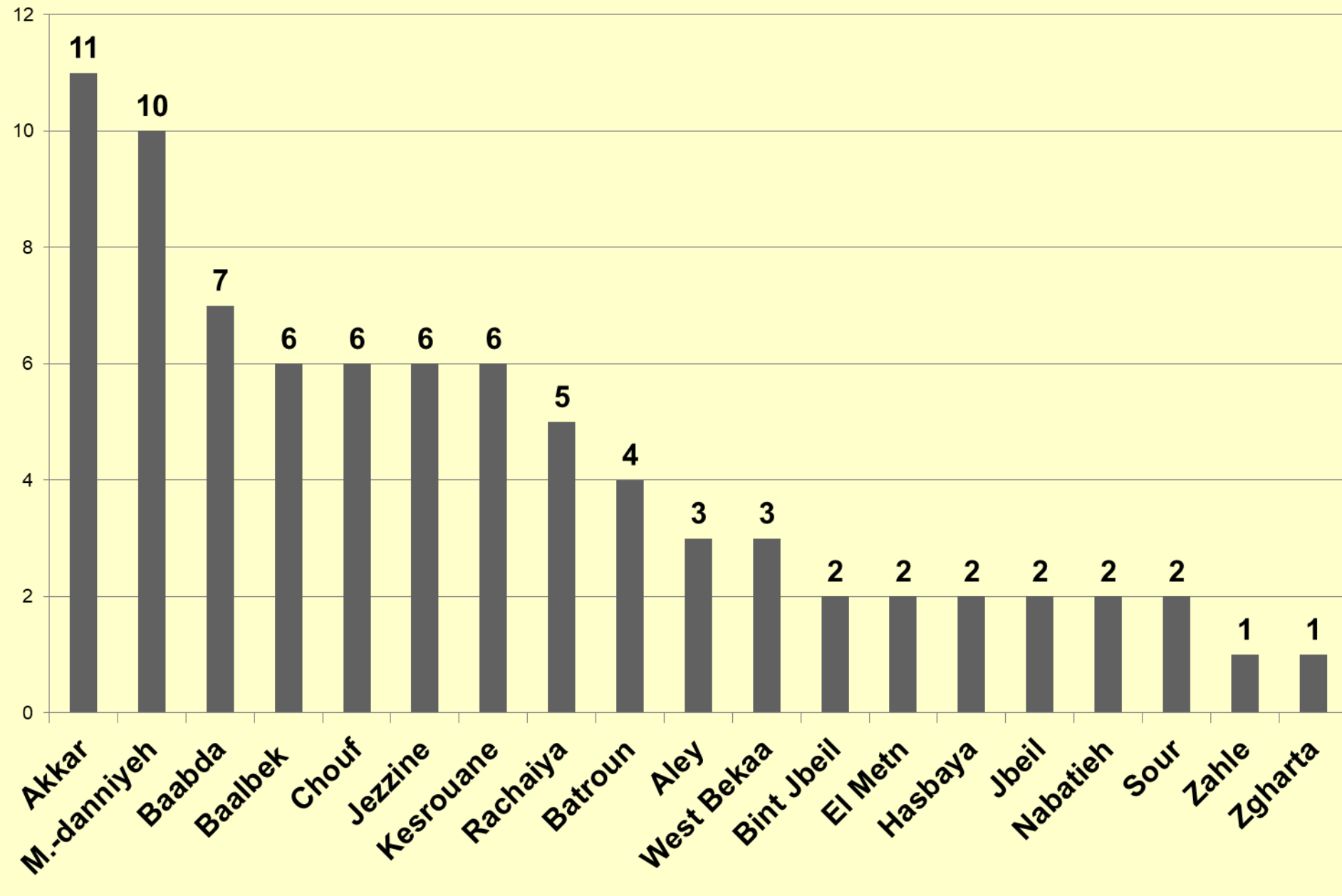
We assume that they cannot be shot at a flight altitude of more than 200m above the ground, maybe even above only 120m.

Therefore we have determined all overnight roosting places of the eagles with GPS tags and also tried to determine the flight height over the ground as exactly as possible.

Habitats selected for roosting sites during autumn and spring migration in Lebanon (n=81)

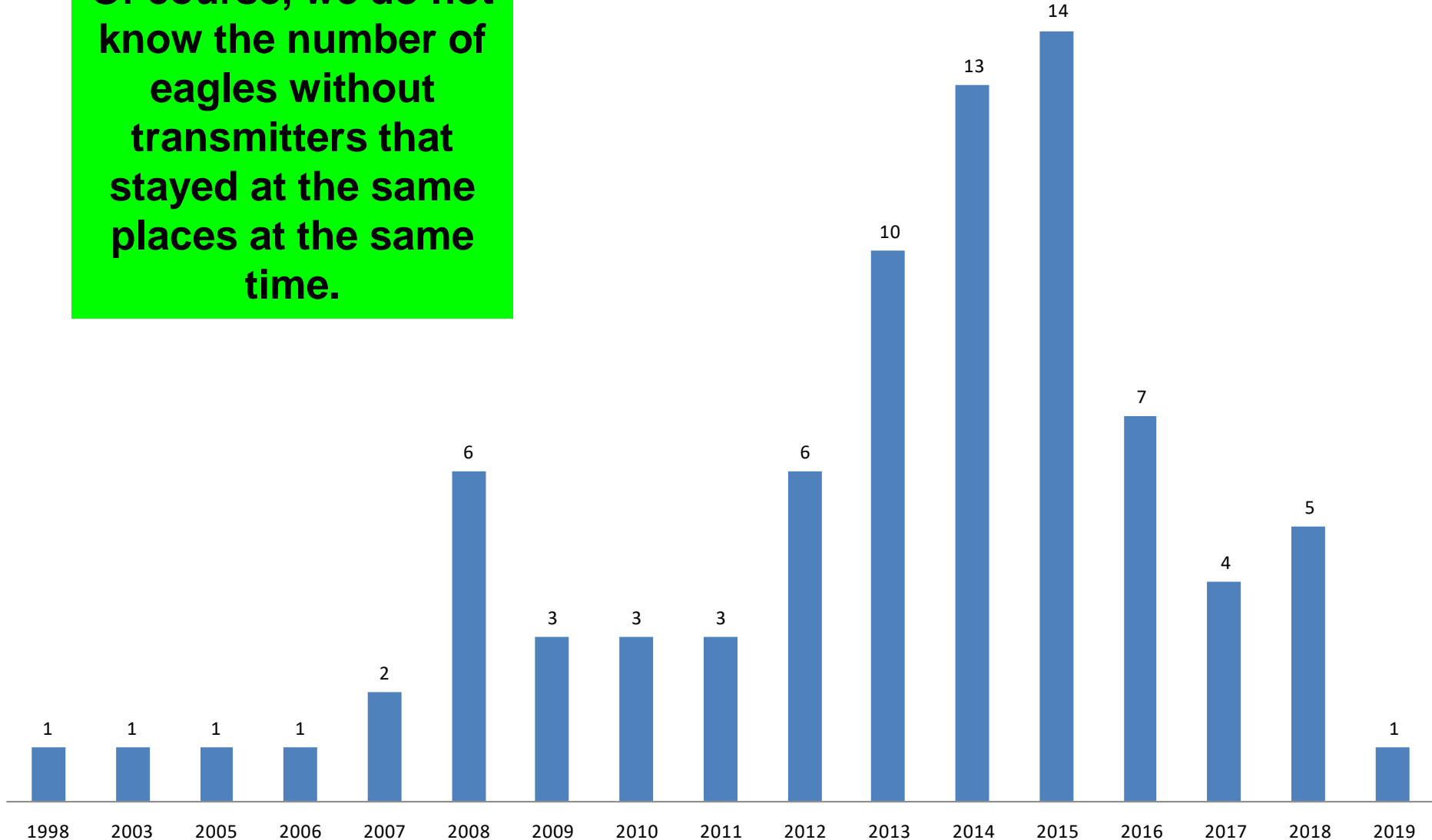


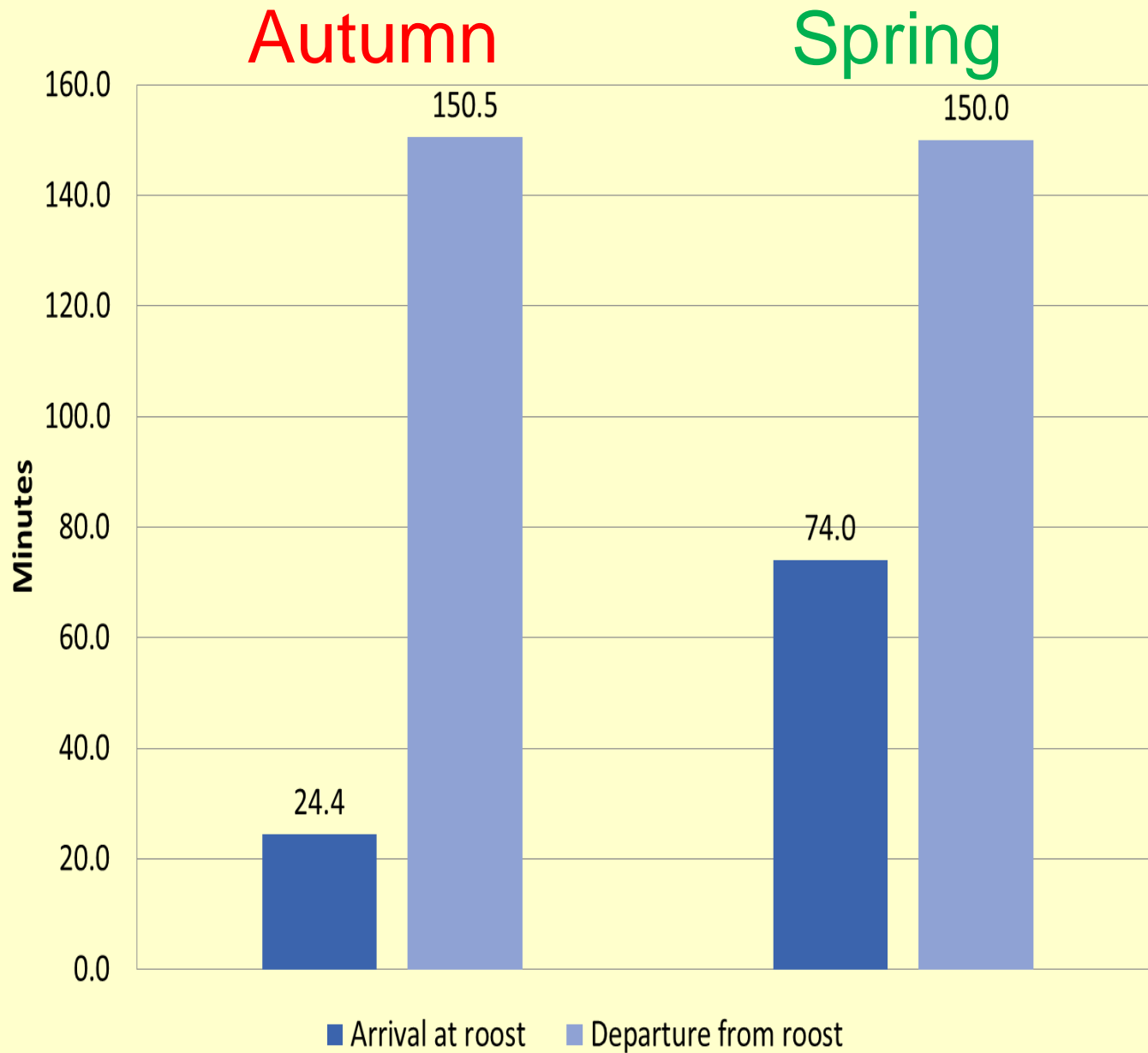
Distribution of overnight roosting sites (n=81) of Lesser Spotted Eagles in Lebanon by administrative districts



Number of recorded roosts per year for Lesser Spotted Eagles during spring and autumn migration over Lebanon (n=81)

Of course, we do not know the number of eagles without transmitters that stayed at the same places at the same time.





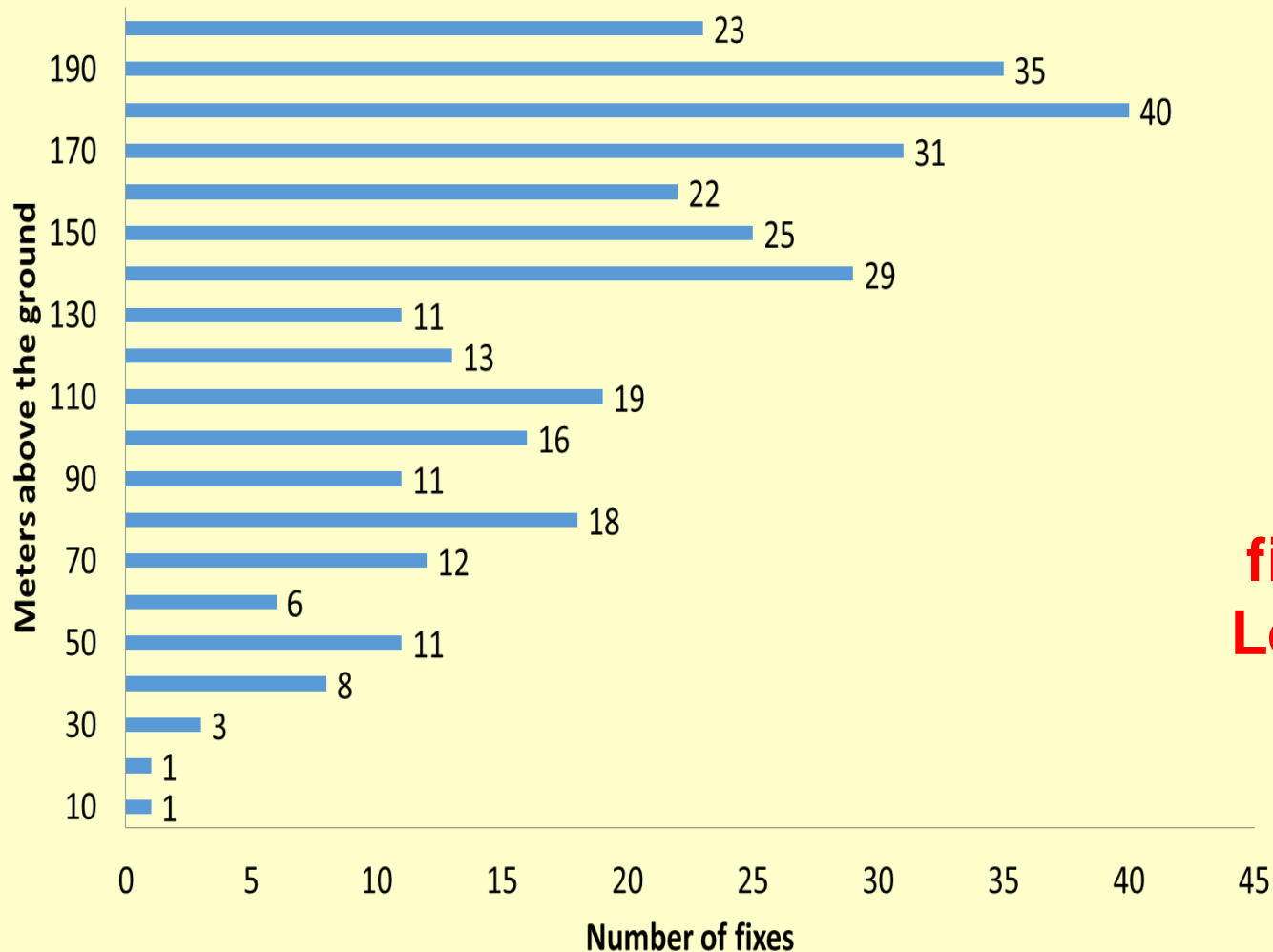
Time span in minutes between:

1) Arrival at roost and sunset (dark blue)

2) Sunrise and departure from roost (light blue)

Sample size: four ad. Lesser Spotted Eagles with GSM tags at their night roosts in different years (n = 18).

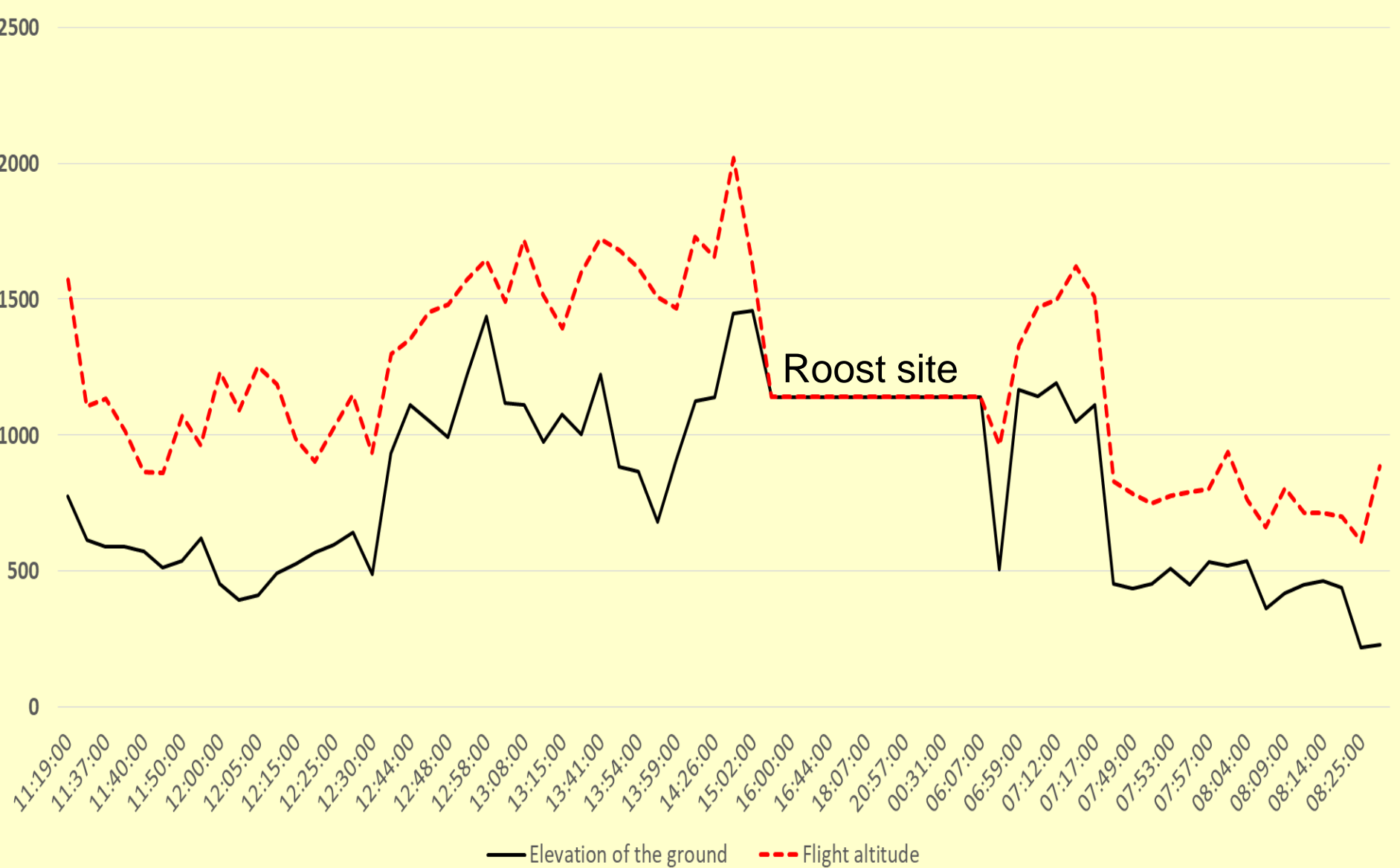
Number of GPS fixes of four eagles in flight with GSM tags above the ground below 200 meters during 15 autumn and spring migrations during 2012-2016



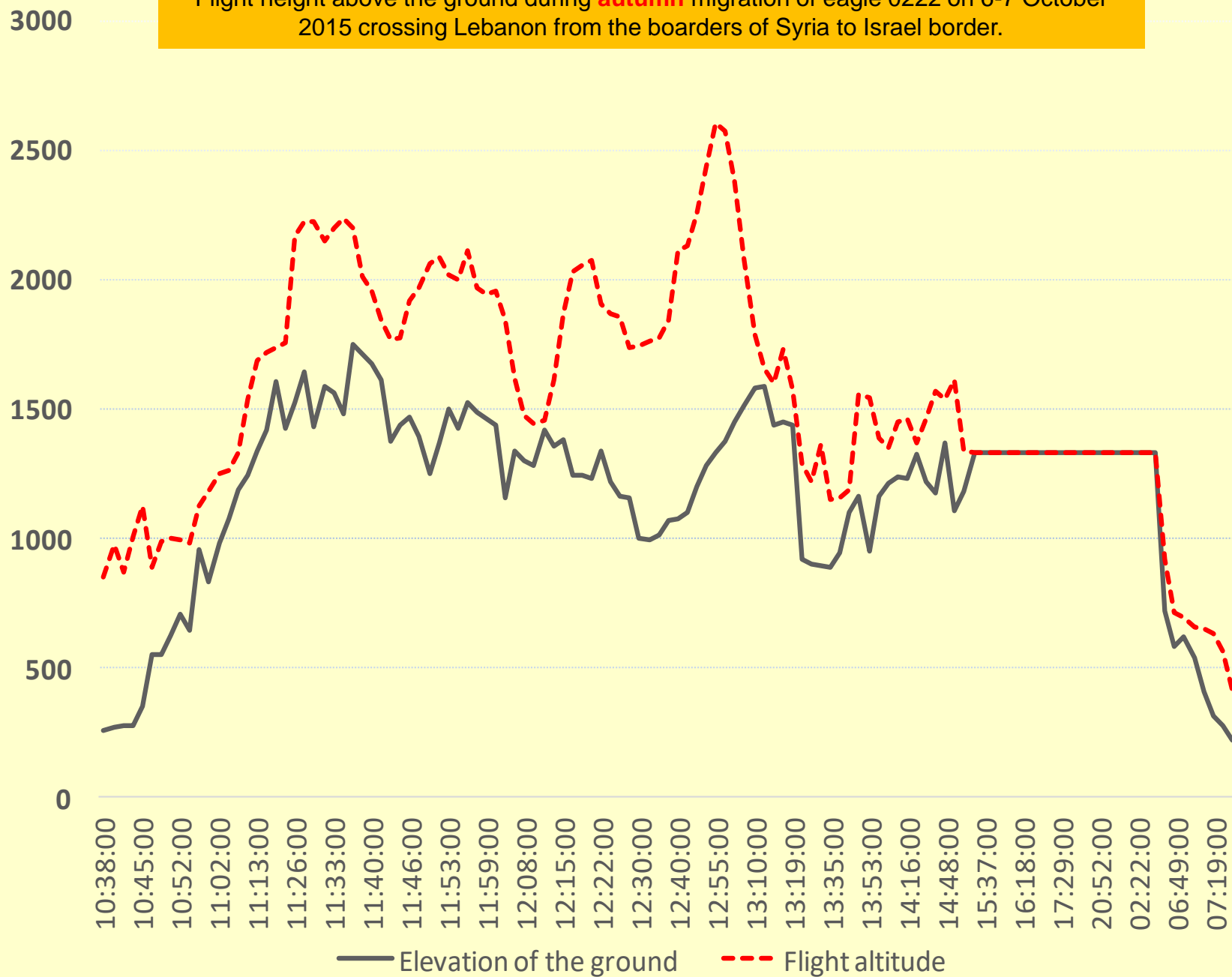
1 GPS fix per 2 min

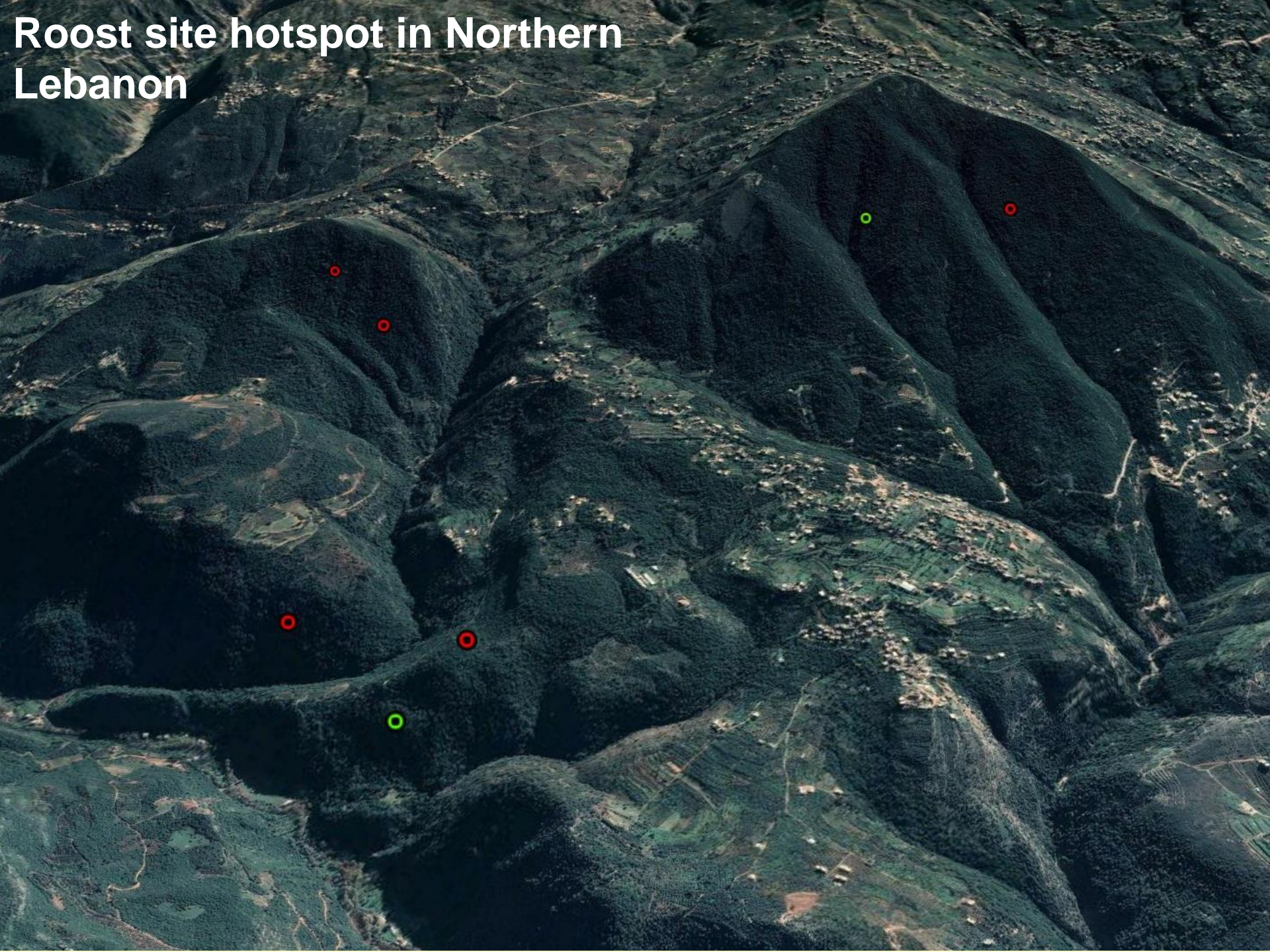
**Only 3,7% of all
fixes in flight over
Lebanon are below
100 meters**

Flight height above the ground during spring migration of eagle 024 during 20-21 March 2014 over Lebanon for the whole crossing of Lebanon from the boarder of Israel to the border Syria.



Flight height above the ground during **autumn** migration of eagle 0222 on 6-7 October 2015 crossing Lebanon from the borders of Syria to Israel border.





Roost site hotspot in Northern Lebanon

Many
thanks for
your
attention



Any questions ?



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Photo: B.-U. Meyburg