

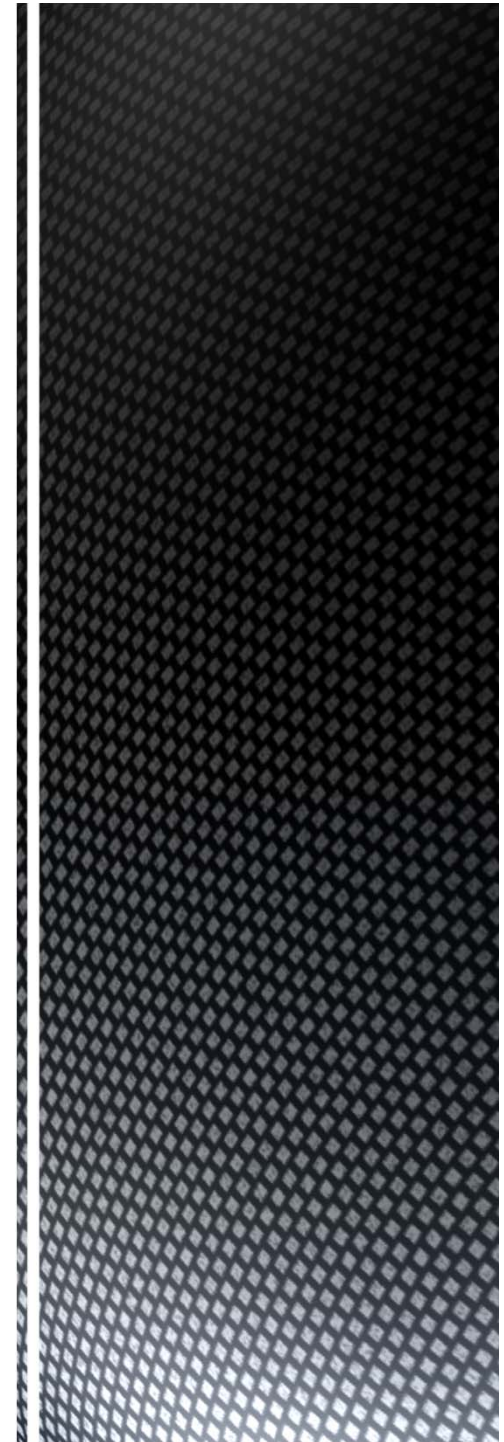
**Long-term monitoring of *Vipera berus*:  
an opportunity to generate site-  
specific evidence on the impacts of  
environmental variables**



**Rick Hodges & Clifford Seabrook**



**KRAG**



# What long-term monitoring data looks like



Longevity

Reproduction

Visibility

Female northern viper (F61) born in 2008. From then until her death by predation in November 2015 she was observed 71 times. There is evidence she reproduced in both 2013 and 2015.

# What data looks like contd

## Adult females Area 3

O- observed birth year
A- assumed birth year
Seen only as adult
Present but not seen
Inferred status
Not seen for 3+ years presumed dead

	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total obs
F17										5
		Sub-adult (SF4)		F20						6
F23		F23			F23	F23				37
		F28			F28					25
Sub-adult			F35							1
Sub-adult			F37	F37	F37	F37	F37			25
Sub-adult			F44		F44	F44				13
O			Sub-adult (SF28)			F52	F52			21
O		J57	Sub-adult (SF34)			F53	F53		F53	32
		Sub-adult		F58						1
O			Sub-adult (SF10)			F59	F59	F59		25
		Sub-adult (Sf5)			F60	F60	F60			13
O			Sub-adult (SF17)			F61	F61	Predated		71
A			Sub-adult		F65		F65			9
A			Sub-adult		F67					2
O			Sub-adult (SF16)			F71	F71			30
A			Sub-adult		F72					1
	A		Sub-adult			F74				1
	A		Sub-adult			F77				1
	A		Sub-adult			F79	F79			3
	O		Sub-adult (SF32)			F81	F81	F81		6
	A		Sub-adult (SF31)			F80				12
	A		Sub-adult			F82	F82			19
		A			Sub-adult		F87		F87	3
		A			Sub-adult		F92	F92		11



Actual	2	2	3	3	8	15	13	5	2
Inferred	0	0	2	3	0	1	0	2	0
<b>Total</b>	<b>2</b>	<b>2</b>	<b>5</b>	<b>6</b>	<b>8</b>	<b>16</b>	<b>13</b>	<b>7</b>	<b>2</b>

# This presentation will cover

- Current monitoring methods
- An example of data interpretation from west Kent
- Priorities for the future



## Monitoring methods – British examples

		Locations	Methods
1.	Tony Phelps <sup>1</sup>	Dorset lowland heaths 1971-1980, 1986-2003; Somerset & South Wales 1989 – 2002	Visual
2.	Sylvia Sheldon <sup>2</sup>	Wyre Forest 1978 – 2015 (Shropshire)	Visual
3.	Rick Hodges & Cliff Seabrook <sup>3</sup>	West Kent chalk grassland (2008 - )	Visual + refuges

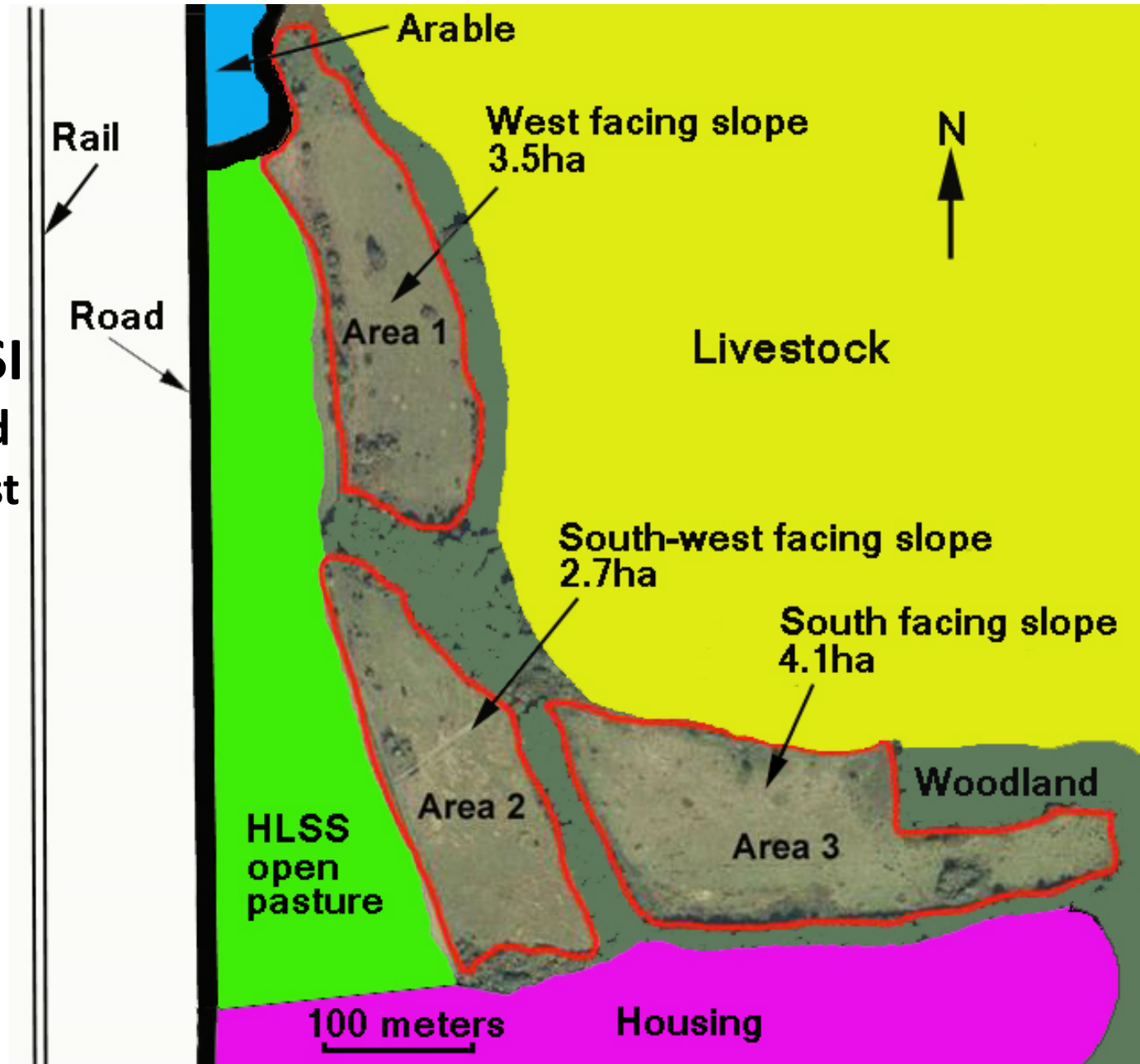
<sup>1</sup>Mertensiella 2004 15: 241-258 & Herp. Bull. 2007 102: 18-31

<sup>2</sup><http://www.wyreforest.net>

<sup>3</sup>Herp. Bull. 2016, 137, 6-12

# The west Kent long-term monitoring site

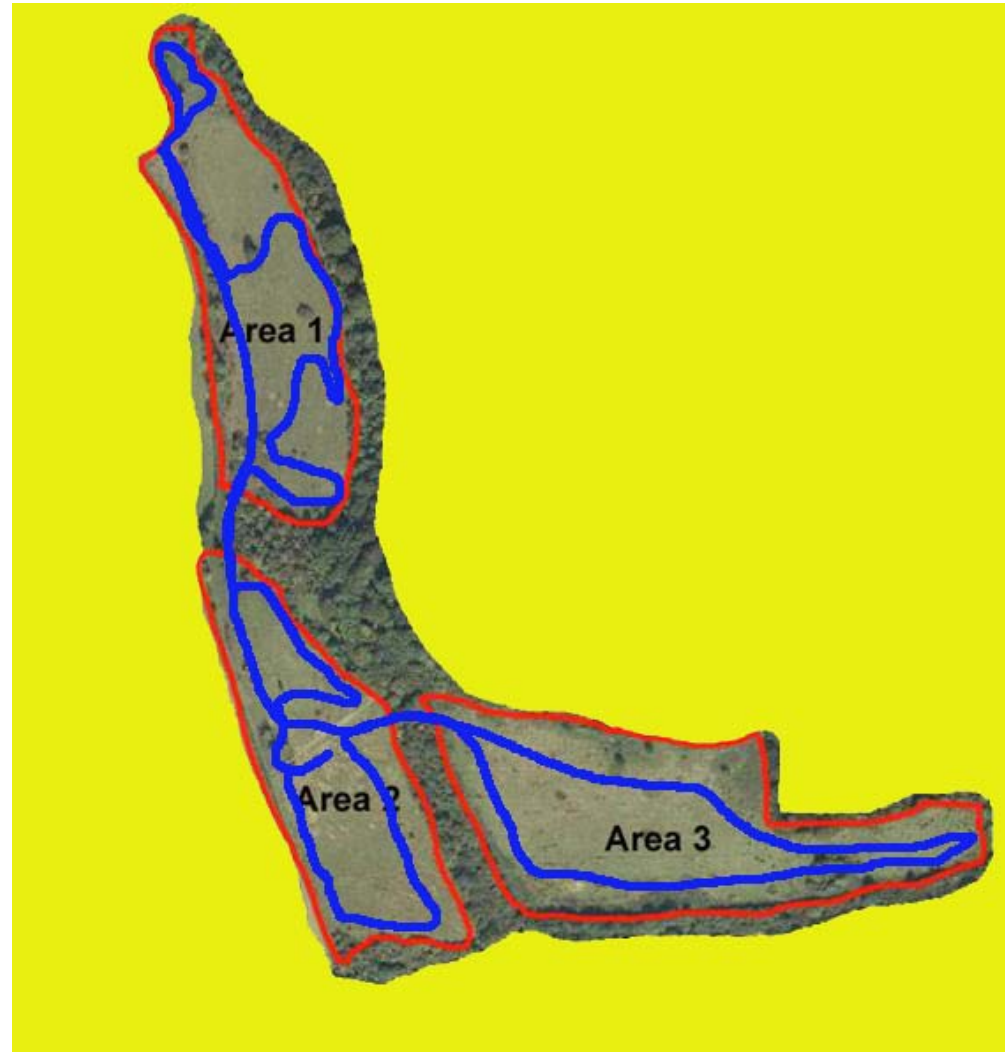
Shoreham SSSI  
Chalk downland  
Kent Wildlife Trust



# How we collect the data

## 1. Standard walk

- Walk of 5.5km taking about 2 hours
- 7 to 10 site visits /month March to October = 60-70 visits/annum



# How we collect the data

## 1. Standard walk

5.5km with refuges at fixed positions

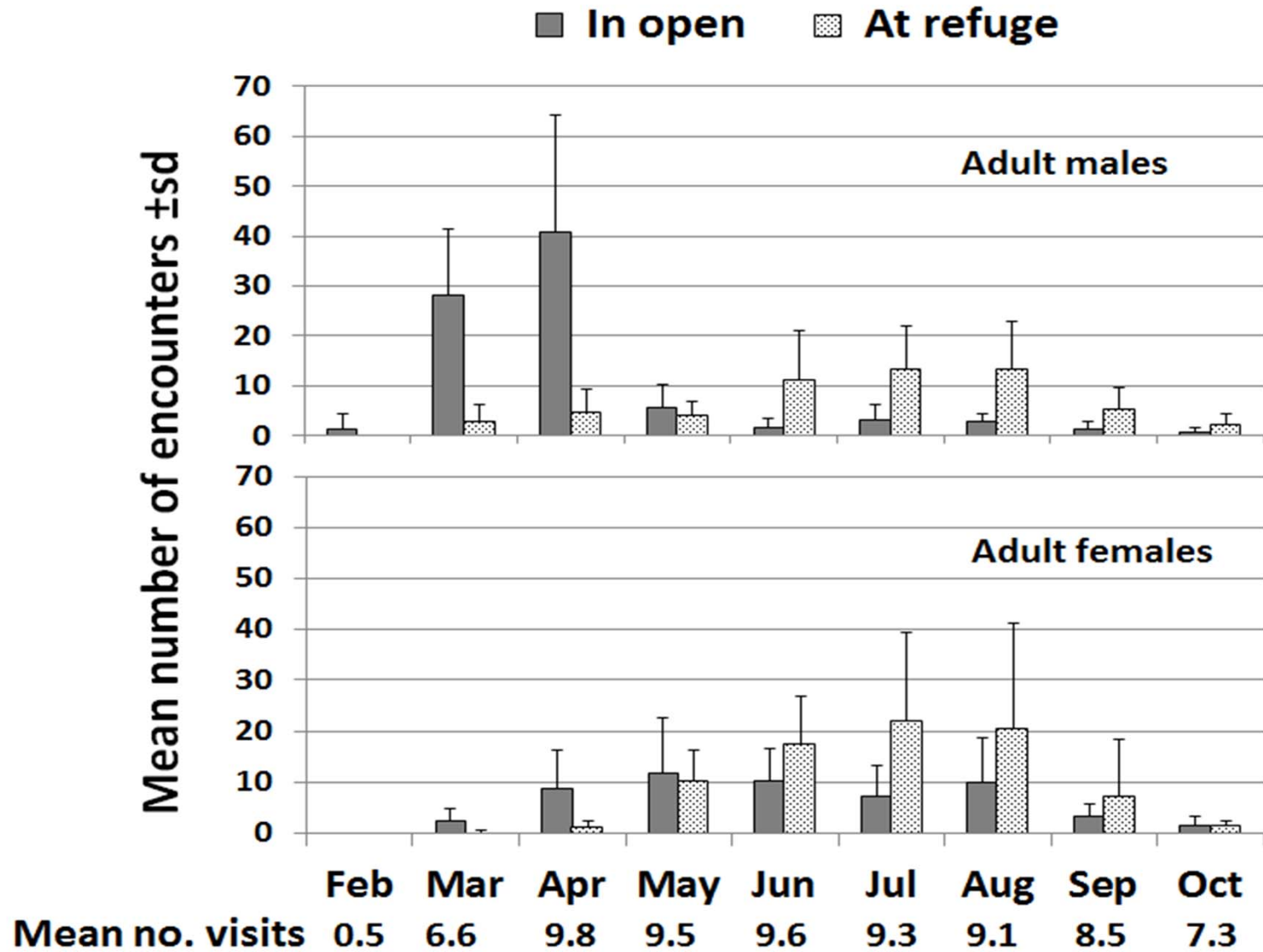
## 2. Refuges

- Corrugated iron and roofing felt covers placed in pairs
- 4 - 5 pairs/ha

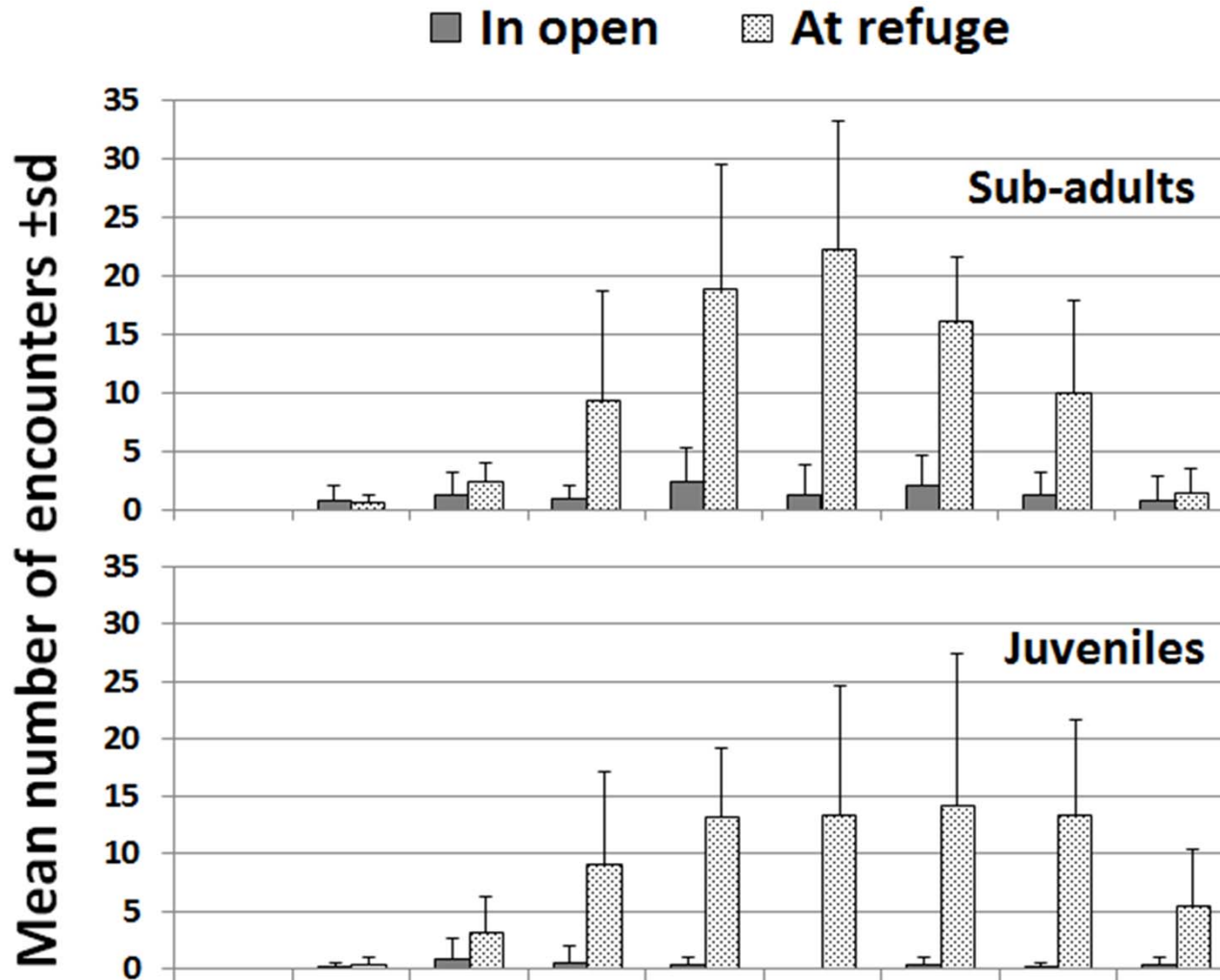




# Mean ( $\pm$ sd) adult adder encounter rates at refuges or in the open: 2008 - 2015



# Mean ( $\pm$ sd) immature adder encounter rates: 2008-2015



Month	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Mean no. visits	0.5	6.6	9.8	9.5	9.6	9.3	9.1	8.5	7.3

# How we collect the data

## 1. Standard walk

## 2. Refuges

## 3. Individual recognition of vipers

- Vipers photographed – no handling involved
- 483 individual vipers recognised, 7% of individuals recorded from juvenile to adult

F20

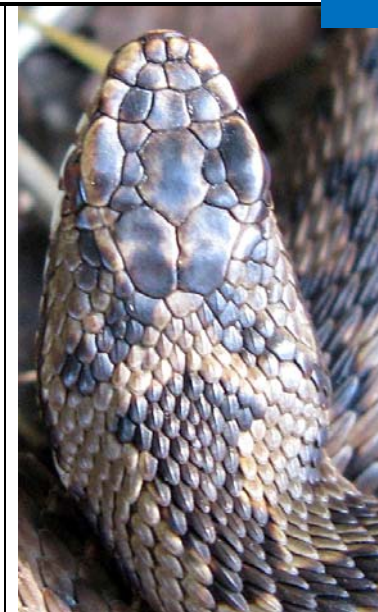


Juvenile



Adult

M59

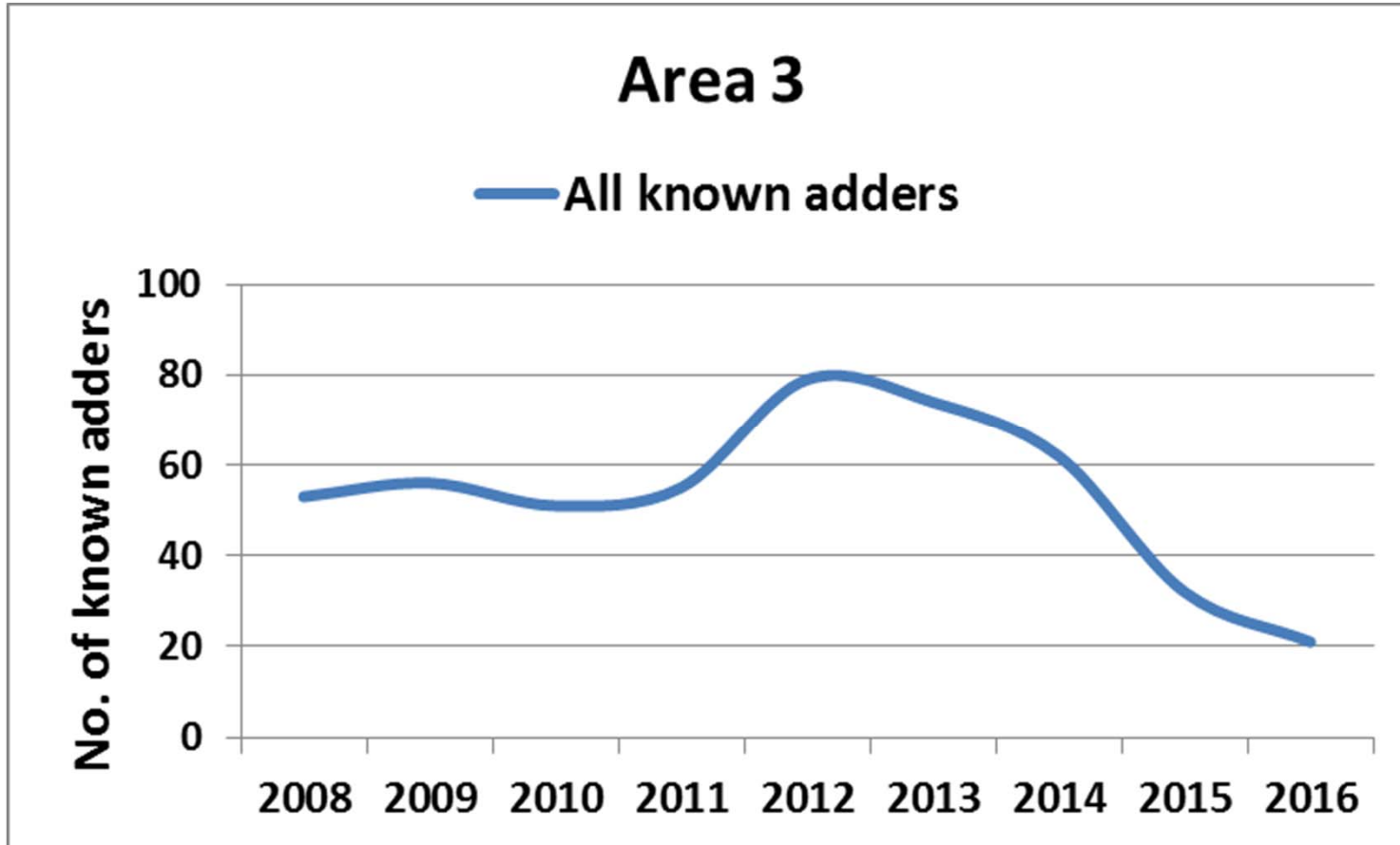


Juvenile



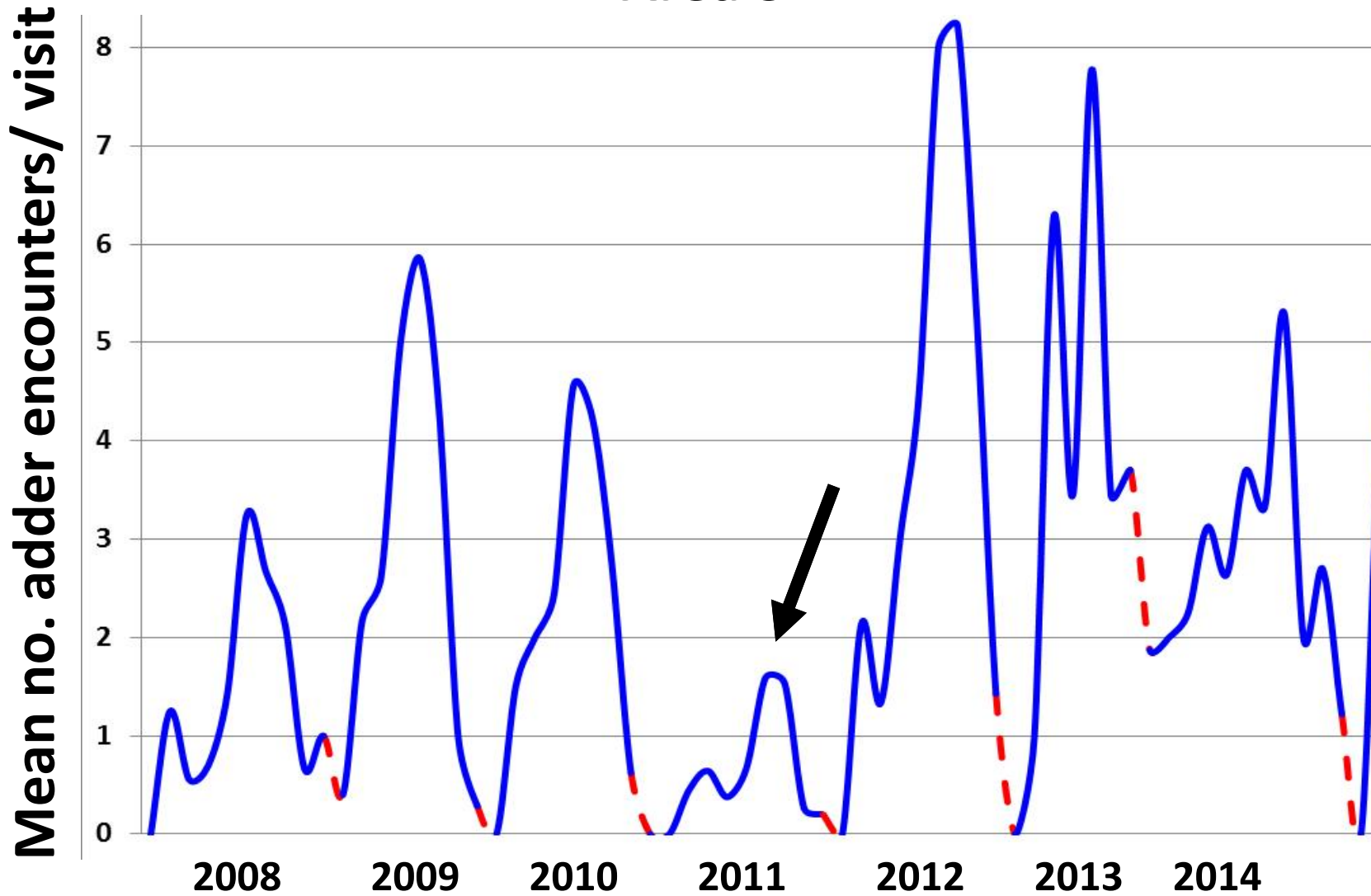
Adult

# Numbers of known adders 2008 – 2016 in Area 3 - are they going to die out?



A strange decline in adder encounter rate in 2011

### Area 3



# Exceptional circumstances 1 - climate

## Deviations from mean monthly rainfall (mm)

	2006	2007	2008	2009	2010	2011	2012	Mean (mm)
April	22.11	-34.09	28.61	-1.09	-23.69	-38.29	62.41	39.4
May	33.32	9.22	20.22	-26.38	-27.88	-41.98	-6.48	52.2
June	-25.65	29.45	-23.45	-22.85	-7.35	29.75	53.25	44.5
July	-26.05	43.55	16.65	20.15	-34.95	-1.75	32.25	43.8
Total (mm)	183.6	228	221.9	149.7	86	127.6	321.3	179.9

## Deviations from mean monthly temperature °C

	2006	2007	2008	2009	2010	2011	2012	Mean °C
April	-0.93	2.17	-1.43	0.75	-0.31	2.83	-2.16	10.13
May	-0.06	0.04	1.74	0.42	-1.29	0.32	0.43	12.76
June	1.01	0.41	-0.09	0.64	1.03	-0.85	-1.46	15.59
July	3.00	-1.40	-0.50	-0.83	1.21	-2.03	-1.87	17.80

Conditions Very dессicating Very dессicating Very moist

Data from Tonbridge weather station – 16km from the reserve  
annual mean for 2004 to 2016

# Exceptional circumstances 2 - Cattle grazing

Area 1: Field 1 (black), Field 2 (orange)  
 Area 2: Field 3 (blue), Field 4 (grey)  
 Area 3: Field 5 (green)

2010

Livestock unit days/hectare

100  
80  
60  
40  
20  
0

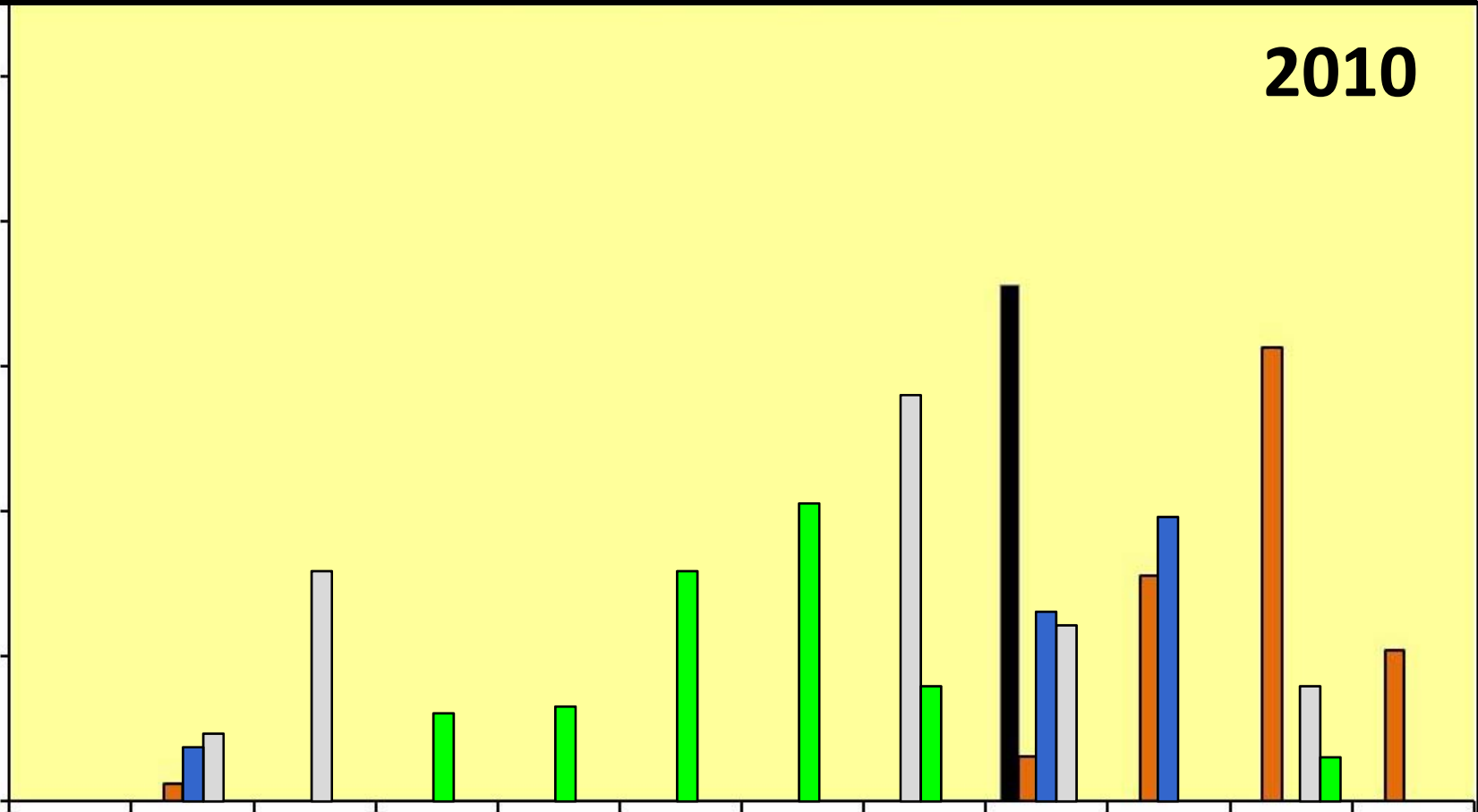
Jan Feb Mar Apr May Jun July Aug Sept Oct Nov Dec

Hibernation

Courtship & mating

Birth/hatching of young

Hibernation



# What's going on ?

## Hypothesis

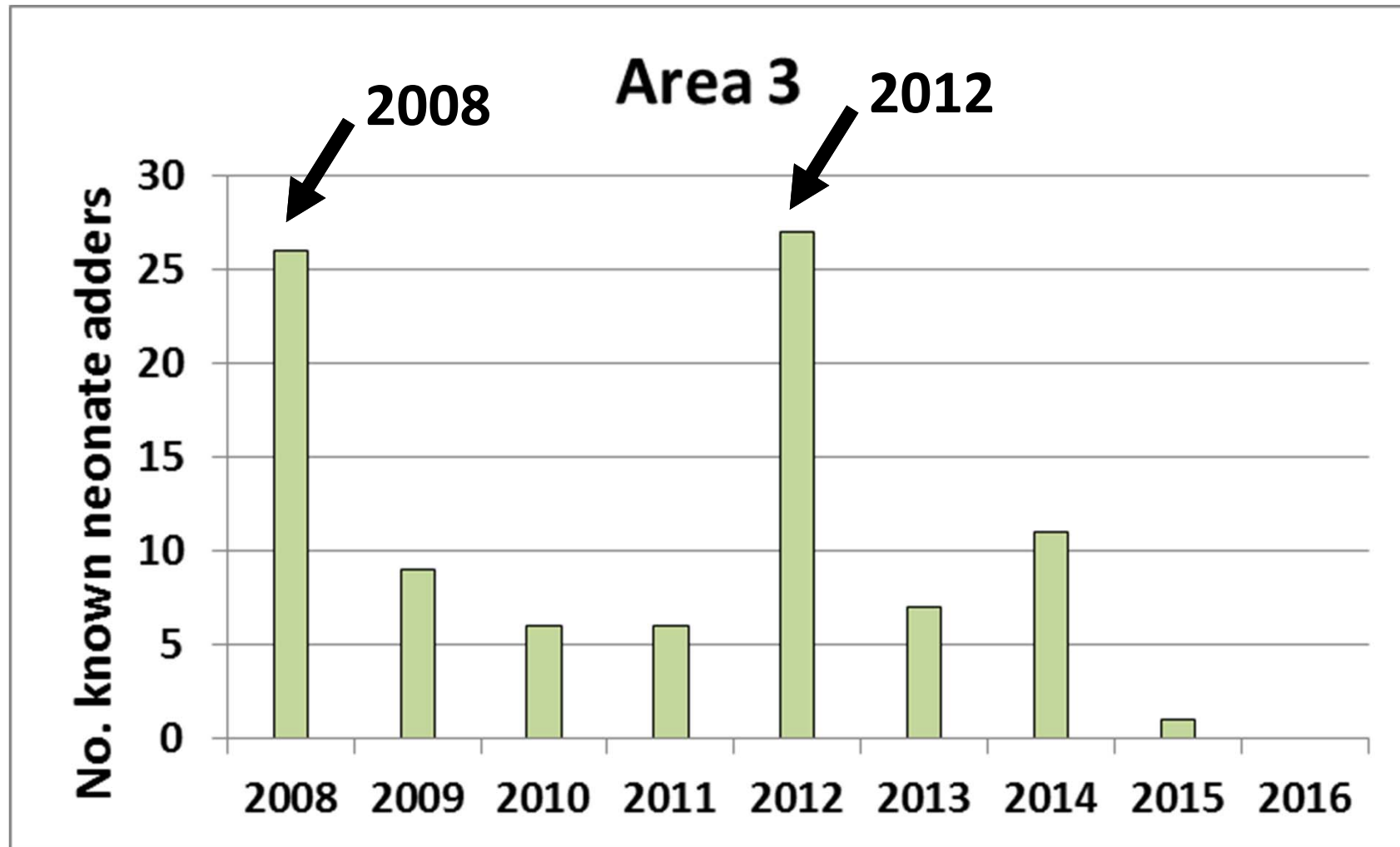
- In 2010 grazing and/or drought resulted in increased disturbance, fewer prey. This limited reproductive success and body weight increase.
- In 2011 after emergence from hibernation underweight adults proceeded directly with foraging not reproduction. This limited the 2011 encounter rate.

## Predictions

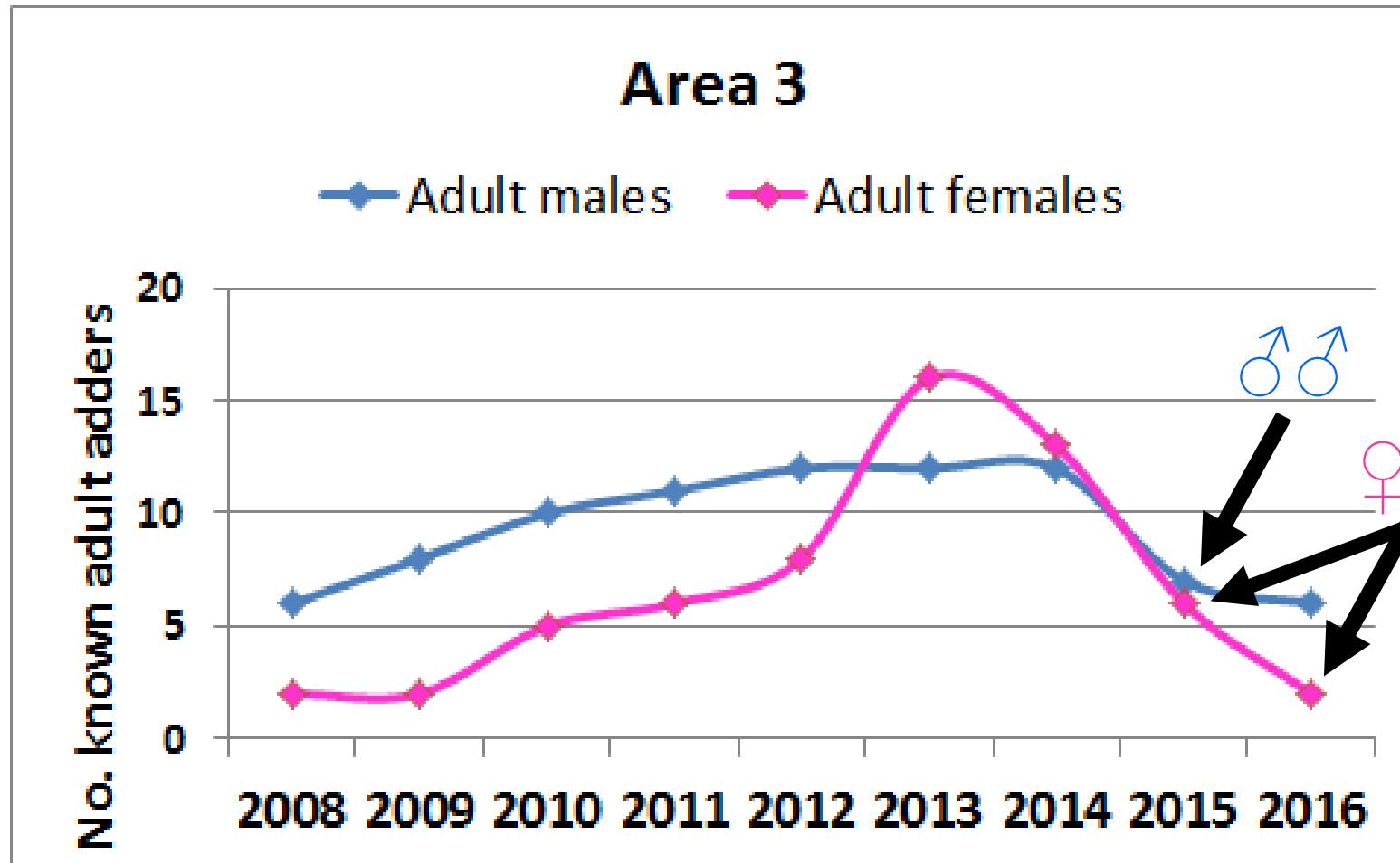
- 1. Doubled reproductive output in 2012.** From females expected to breed in 2011 + those expected to breed in 2012.
- 2. Reduced adult recruitment.** Poor reproductive output 2010/2011 limits number of adults - males in 2014/2015, females in 2015/2016



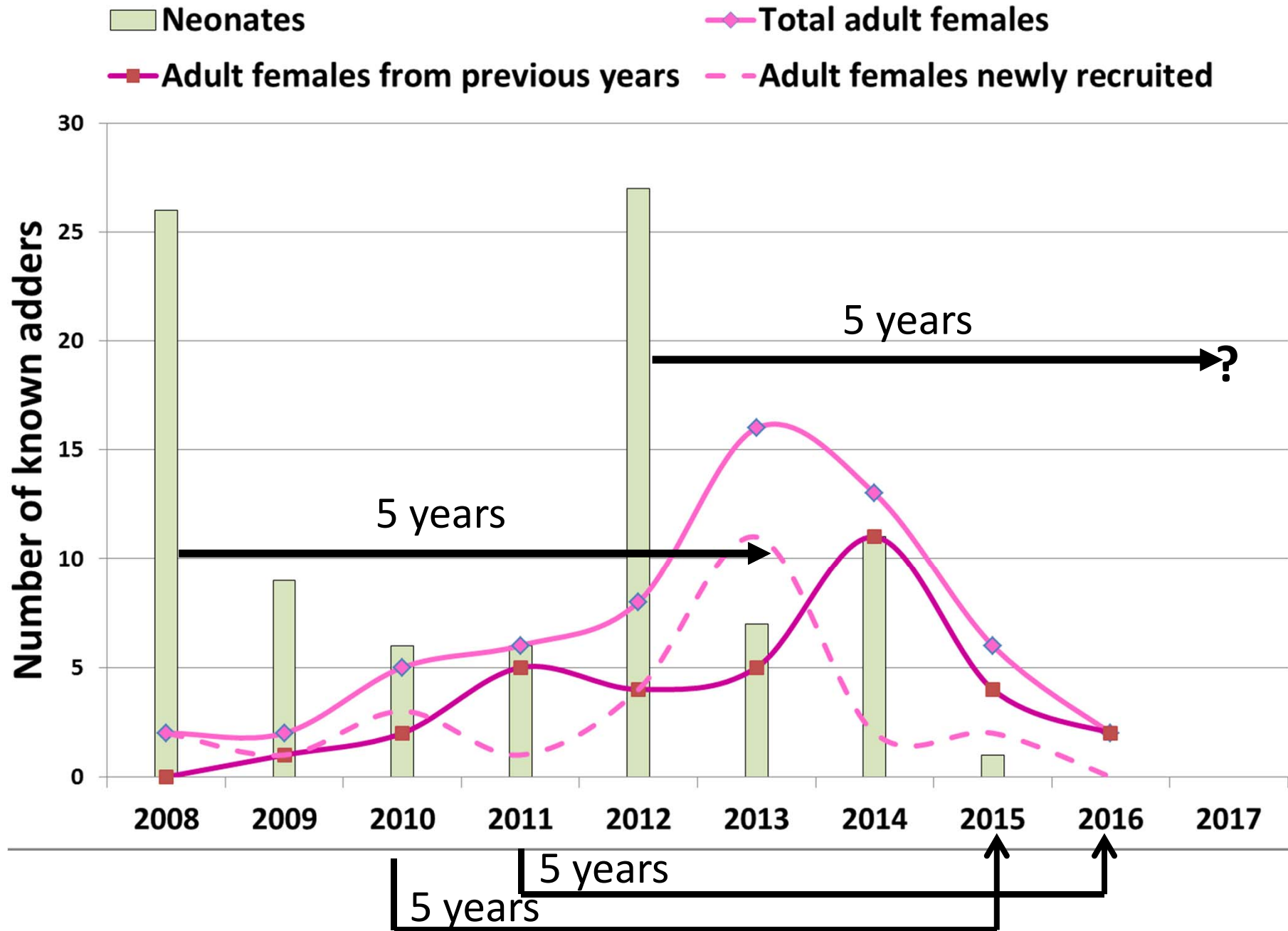
# Prediction 1 - reproductive output doubled in 2012?



## Prediction 2 - recruitment reduced for adult males 2014/2015 & adult females 2015/2016



# More detailed explanation - adult females



## Conclusions and future priorities

- Long-term monitoring can give essential insights into environmental impacts and adder behaviour
- More long-term studies and wider geographical coverage should help improve site specific conservation and our estimation of 'conservation status'
- Need some agreement on preferred methodology so that studies are comparable/compatible **but** different habitats may require different approaches
- Long-term studies across Britain may benefit from co-ordination and joint reporting to maximise impact