Effect of prolonged dormancy on the population dynamics of *Fritillaria meleagris*

by Irina Tatarenko, Emma Rothero, Mike Dodd & David Gowing

Floodplain Meadows Partnership, Open University, UK

Fritillaria meleagris, (snake's-head fritillary) is a rare and endangered European species, usually found on old, traditionally-managed floodplain meadows, few of which remain in the UK.

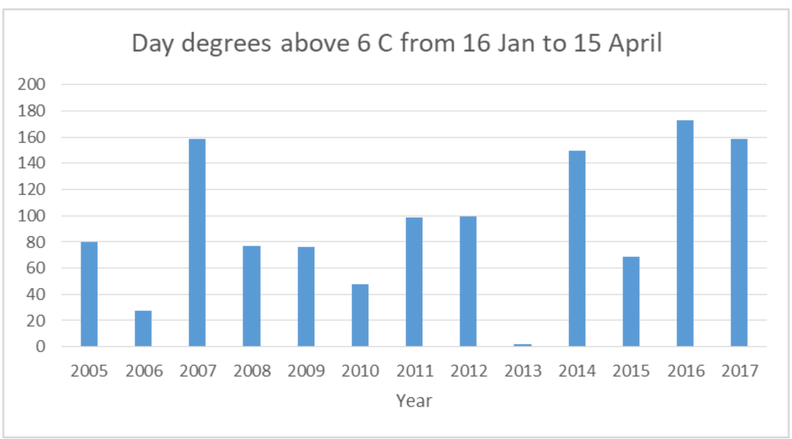
Volunteers have undertaken an annual count of snake's-head fritillaries since 1999 at North Meadow, Cricklade (Wilts.,) which holds the UK's largest population of the species. Flowering and vegetative plants were counted in 1 x 1 m quadrats at 200 fixed locations.

Fritillaries emerge in March/April, soon after the winter floods recede. In 2013, almost the entire population on North Meadow stayed completely below ground, meaning thousands of plants remained dormant for a whole year.

Ground water dynamics, soil temperature and total number of plants in North Meadow, Block 1 (120 quadrats) experimental area in 2004-2017

What is the trigger for mass dormancy?

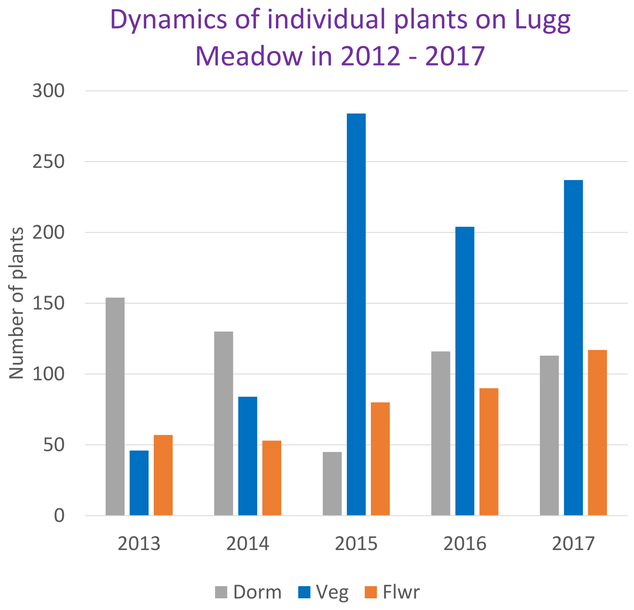
Fritillaria meleagris is well adapted to floodplain environments, provided the soil drains (Tatarenko *et al*., 2014). North Meadow failed to drain at all during summer 2012, due to persistent heavy rain. Soil saturation may affect bud morphogenesis and trigger dormancy in the next growing season.



Low spring temperatures have been shown to affect root growth in other species (Shefferson *et al*, 2001; Kéry *et al*., 2005), which, in turn, can stop growth of the buds (Boeken, 1991).

Low soil temperatures, such as those in spring 2013, may also be a dormancy trigger in *Fritillaria meleagris*.

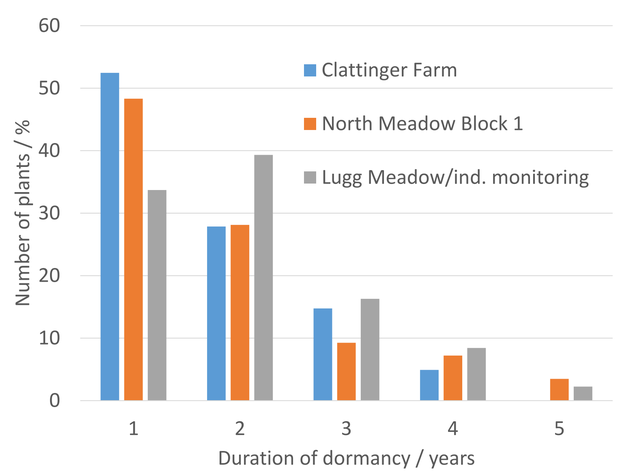
Is dormancy a regular feature of *F. meleagris* life history?



235 individual plants were monitored with 1 cm resolution, using a differential GPS on Lugg Meadows, Hereford:

Between 10 and 60% of plants stayed dormant each year (30% on average).

Long-term monitoring of populations at North Meadow and nearby Clattinger Farm, as well as observations of individual plants on Lugg Meadows, suggest that dormancy of 1-2 years is more frequent than dormancy for longer periods.



Dormancy is a regular and important feature in a life history of *F. meleagris*.

Low soil temperatures in spring and/or soil saturation in the preceding year, may push *F. meleagris* populations into dormancy.

References

Boeken, B. 1991. Above-ground emergence in the desert tulip *Tulipa systola* Stapf. in the Negev desert of Israel. Funct. Ecol. 5: 705–712.

Kéry, M., Gregg, K.B., Schaub, M. 2005. Demographic estimation methods for plants with unobservable life-states. Oikos. 108: 307–320.

Shefferson R.P., Sandercock B.P., Proper, J., Beissinger, S.R. 2001. Estimating dormancy and survival of a rare herbaceous perennial using mark–recapture models. Ecology. 82(1):145–156.

Tatarenko, I., Dodd, M., Rothero, E., Gowing, D. 2013. Citizen science in meadow studies: population dynamics in *Fritillaria meleagris* on North Meadow (Wiltshire, UK). In: Research and Conservation of Floodplain Meadows. Kaluga, Russia.