

The Vanishing Viper 2025: Themes from a meeting to discuss better conservation for *Vipera berus*, with emphasis on landscape-level approaches

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Feedback form a workshop on ‘Defining disturbance to *Vipera berus*, its impacts, and considerations for land management’

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Workshop Objective:

To critically discuss and outline the perceptions of conference delegates to disturbance of *Vipera berus*, including its impacts at the individual and population scales, and how such impacts may be avoided and mitigated through landscape-scale approaches to management.

Approach:

- The workshop comprised 12 groups of between 8-10 individual delegates.
- Each group was randomly allocated one of three different themes: (1) Types of disturbance; (2) Impacts resulting from disturbance; (3) Mitigation and management of disturbance and its impacts
- Each group were to use the prompts to discuss their allocated theme, consolidating their discussion on flip-chart paper.

Key Findings:

Theme (1): Types of disturbance

Prompts:

- *What types of public pressure/activities may cause disturbance to vipers? What specific practices (within these activities) might be of particular concern?*
- *Which of these pressures do you experience at your sites of interest?*

- *Should we differentiate activities that result in either incidental or purposeful disturbance? Does this matter?*

Findings:

1. Agreement amongst some delegates as to how disturbance should be broadly defined (i.e. anything that has the potential to alter species-typical (normal) behaviour), albeit there is suggestion that further definition and differentiation is required between both direct and indirect disturbance, but also incidental and purposeful disturbance, and chronic and acute disturbance.
2. Delegates acknowledged a broad range of types/sources of potential disturbance to vipers, across both recreational and non-recreational groups.
3. Of those sources of disturbance attributed to human recreation, dog walking was the most frequently cited amongst the delegation (11.8% of contributions), followed by photography (10.3%), motorised vehicle and mountain biking, respectively (both 5.9%).
4. Of the non-recreational sources of disturbance, both fires and land management practices were most frequently perceived to cause disturbance to vipers (both 8.8%), followed by game birds (and their management) (5.9%).

Table 1. Sources of disturbance to *Vipera berus* as reported by workshop delegates, including the frequency each source was mentioned in feedback and the percentage of total responses attributed to each disturbance type.

Disturbance type	Source	Frequency cited	Percentage (%) of total
Recreational	Dog walking	8	11.8
	Drones	1	1.5
	Horse riding	3	4.4
	Motorised vehicles	4	5.9
	Mountain biking	4	5.9
	Photography	7	10.3
	Picnicking	1	1.5
	Recreational events (e.g. park runs and festivals)	2	2.9
	Running	3	4.4
	Walking/hiking/rambling	3	4.4
	Wild camping	2	2.9
	Wildlife surveying	2	2.9
	Wildlife watching	3	4.4
Non-recreational/other	Collection	1	1.5
	Direct persecution	3	4.4

Domestic livestock	3	4.4
Feral cats	1	1.5
Fires (habitat management, arson or recreational)	6	8.8
Game birds (and their management)	4	5.9
Land management (excluding fires)	6	8.8
Smoking/vaping	1	1.5

Theme (2): Perceived impacts resulting from disturbance

Prompts:

- *What impacts do you consider may result from public pressure, both at the individual and population scales (i.e. physiology, behaviour, movements, reproduction)?*
- *What other factors may interact with public pressure to exacerbate its impacts on adders?*
- *Might certain activities and undesirable practices have more of an impact than others? If so, what might these be?*

Findings:

1. A diverse range of perceived impacts were identified by delegates, addressing different aspects of viper ecology.
2. Contributions comprised a combination of direct and indirect impacts, the majority of which reflected potential in the survivorship of vipers (20.5% of contributions), their ability to reproduce (17.9%), changes in their spatial ecology and physiology (both 15.4%, respectively).
3. The majority of suggestions centred on vipers as individuals, reflecting the potential challenges in forecasting population-level effects in the absence of robust research.
4. Some delegates rightly identified that contributions are perceived impacts, largely based on anecdotal evidence and speculation, thus dedicated research is warranted to effectively differentiate between perceived and actual impacts of disturbance.
5. Several groups of delegates indicated that both the type and magnitude of potential impacts resulting from disturbance will likely reflect a multitude of interacting factors (e.g. season, weather, predation pressure, habitat quality, access to land, social media and irresponsible PR). Delegates noted the likelihood of site-specific variance in disturbance and its subsequent impacts, with some groups suggesting that disturbance may not be cause for concern at many sites, relative to other threat factors.

Table 2. Impacts on *Vipera berus* identified by workshop delegates, with cited examples. The table includes the frequency each impact was mentioned in feedback and the percentage of total responses attributed to each impact category.

Impact to...	Examples	Frequency cited	Percentage (%) of total contributions
Physiology	Elevated cortisol levels; delayed spermiogenesis in males; poor body condition; becoming immunocompromised	6	15.4
Spatial ecology	May become more sedentary; dispersal effects; abandonment of key (micro) habitats; occupancy of sub-optimal habitats	6	15.4
Reproduction	Reduction in reproductive fitness; reduced fecundity; disruption to mating/reproductive behaviours; potentially smaller populations; genetic erosion	7	17.9
Behaviour	Habituation with repeated exposure; disruption to behavioural thermoregulation	4	10.3
Diet/Feeding	Reduction in prey availability; regurgitation of prey when disturbed; disturbs foraging behaviour	4	10.3
Survivorship	Less predation risk (if persistently disturbed); trampling of vipers (in habitat or under ACOs); general injury and/or death; dog attacks	8	20.5
Other (direct/indirect)	Viper bites to dogs; Advertising presence of vipers; negative PR; misdirected conservation efforts	4	10.3

Theme (3): Mitigation and management of disturbance and its impacts

Prompts:

- *What potential solutions could be employed to address the issue of public pressure on vipers?*
- *What experiences do you have with managing public pressure on your sites of interest? What were the benefits and challenges associated with these (i.e. were they effective?)?*
- *What would you need to support the enhanced provision of future measures to effectively manage public pressure (i.e. capacity building)?*

Findings:

1. A broad range of interventions were captured during the workshop discussion, including habitat management, education and awareness, policy, legislation and enforcement, capacity building and several other miscellaneous measures of mitigation/management.

2. The majority of delegate contributions centred around themes of education and awareness (30.8%) and habitat management (25%), with other/miscellaneous suggestions and those concerning policy legislation and enforcement being cited reasonably frequently (21.2% and 19.2% of contributions, respectively). Suggestions concerning capacity building received the least amount of focus by delegates (3.8%).
3. With respect to specific suggestions, interventions to better manage access to sensitive areas (e.g. hibernacula) through both naturalistic and artificial barriers was the most frequently cited (15.4%), followed by the use of educational signage and dedicating alternative spaces and/or facilities for recreational use (both 9.6%), and the need to share best practices and positive outcomes resulting from research and experimental land management practices (7.7%).

Table 3. Mitigation and management interventions identified by workshop delegates, including the number of times each intervention was mentioned in feedback and the proportion of total responses attributed to each.

Mitigation type	Intervention	Frequency cited	Percentage (%) of total
Habitat Management	Access management - sensitive areas (i.e. barriers)	8	15.4
	Better maintenance of paths/routes	1	1.9
	Complete public exclusion	1	1.9
	Enhancing habitat connectivity	2	3.8
	Fire management (i.e. firebreaks)	1	1.9
Education, awareness and communication	Vipers as a species to be championed	1	1.9
	Best-practice guidance for recreationists	1	1.9
	Educational signage at sites	5	9.6
	Positive messaging and narratives towards target recreationist groups	1	1.9
	Public engagement events and campaigns	3	5.8
	Sharing best practices and positive outcomes (management)	4	7.7
	Zoo-based education	1	1.9
Policy, legislation and enforcement	Enforcement on sites	3	5.8
	Include species in site designations	1	1.9
	Legislate recreational activities	2	3.8
	Legislate sites	1	1.9
	Legislate species	3	5.8
Capacity building	Collaboration with other NGOs and charities	1	1.9
	Funding	1	1.9
Other	Dedicated alternative spaces/facilities for recreation	5	9.6
	Effective survey design and methods	3	5.8

Not publicising viper presence	2	3.8
Sensitive placement/positioning of feeders for game birds	1	1.9
