# Green Status of Species: Supplementary information

## Sterling's Toothed Toad (*Oreolalax sterlingae*)

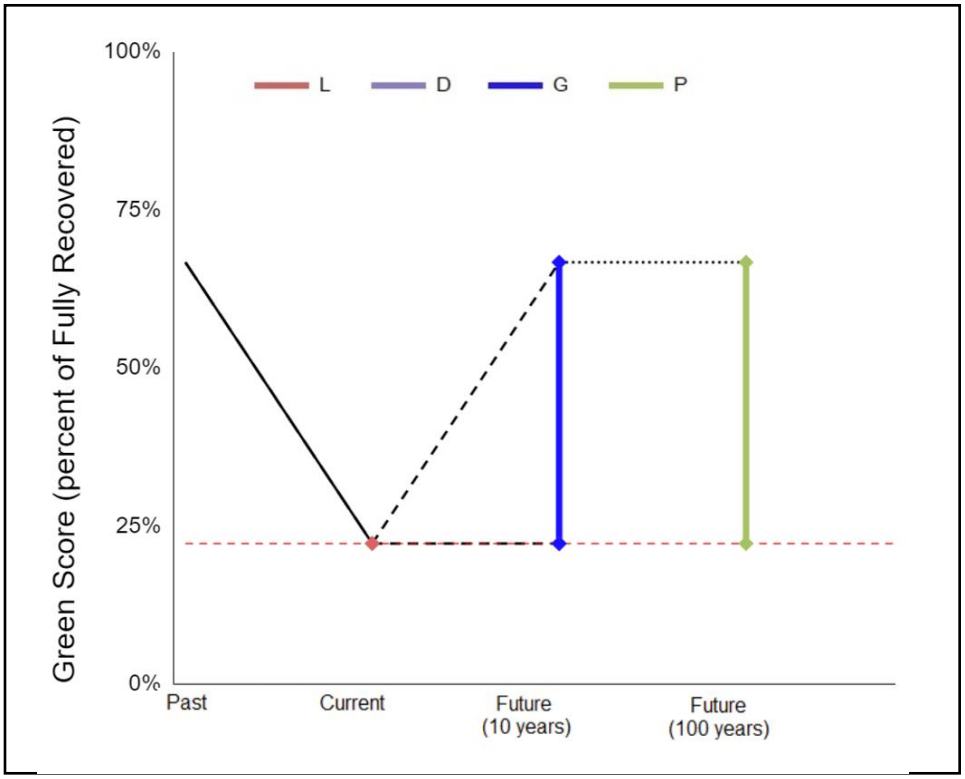


**Figure S1.** Graphical representation of the conservation metrics based on the Green Scores. Key: Vertical arrows represent the four conservation metrics: L – Conservation Legacy (may not appear if current and counterfactual states are the same); D – Conservation Dependence (may not appear if current and future-without-conservation states are the same); G – Conservation Gain (may not appear if current and future-with-conservation states are the same); P – Recovery Potential (may not appear if current and potential states are the same). The horizontal red dashed line represents the Current Green Score. Solid black line: observed change in the Green Score of the species (ignore it if "Former" state is not specified). Long-dashed black line: (counterfactual) past change expected in the absence of past conservation efforts. Dashed black lines: future scenarios of change expected with and without current and future conservation efforts. Dotted black line: long-term potential change expected with future conservation innovation and efforts.

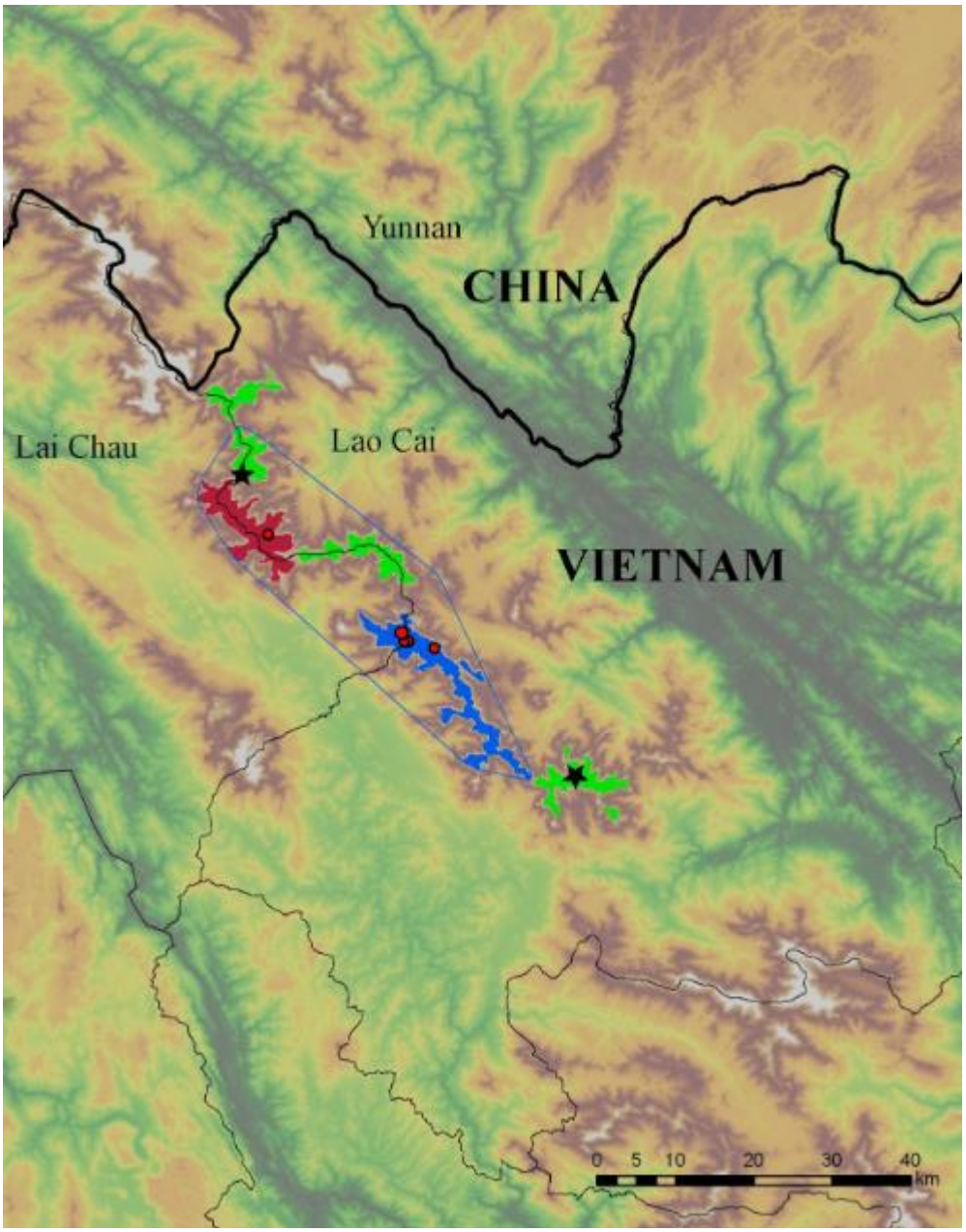


**Figure S2.** Distribution range of *Oreolalax sterlingae* in the Hoang Lien Range, northwest Viet Nam. Red dots indicate existing known locations, black stars indicate where species was not detected in suitable habitat. Solid blue area represents Mount Fansipan (SU1), maroon area represents Mount Pu Ta Leng (SU2) and green area denotes areas where this species may be possibly extant (Suitable habitat spatial unit – SU3). Grey outline denotes species' extent of occurrence (Tapley *et al.* 2020a, IUCN SSC Amphibian Specialist Group2021).

**Table S1.** Conservation Actions (list of action codes) [SU1 = Mount Fansipan, SU2 = Mount Pu Ta Leng, and SU3 = Suitable habitat].

| Classification | Full Description | Past actions (no longer occurring) | Current actions | Actions planned within 10 years | Actions that could be implemented in the long-term aspiration scenario |
|---|---|---|---|---|---|
| 1.1. | 1.1. Land/water protection: Site/area protection | | SU1, SU2, SU3 | SU1, SU2, SU3 | SU1, SU2, SU3 |
| 1.2. | 1.2. Land/water protection: Resource & habitat protection | | | SU1 | SU2, SU3 |
| 2.1. | 2.1. Land/water management: Site/area management | | | SU1 | SU2, SU3 |
| 2.2. | 2.2. Land/water management: Invasive/problematic species control | | | | |
| 2.3. | 2.3. Land/water management: Habitat & natural process restoration | | | | |
| 3.1.1. | 3.1.1. Harvest management | | | | |
| 3.1.2. | 3.1.2. Trade management | | | | |
| 3.1.3. | 3.1.3. Limiting population growth | | | | |
| 3.2 | 3.2 Species recovery | | | | |
| 3.3.1. | 3.3.1. Species re-introduction: Reintroduction | | | | |
| 3.3.2. | 3.3.2. Species re-introduction: Benign introduction | | | | |
| 3.4.1. | 3.4.1. Ex-situ conservation: Captive breeding/artificial propagation | | | | |
| 3.4.2. | 3.4.2. Ex-situ conservation: Genome resource bank | | | | |

| Classification | Full Description | Past actions (no longer occurring) | Current actions | Actions planned within 10 years | Actions that could be implemented in the long-term aspiration scenario |
|---|---|---|---|---|---|
| 4.1. | 4.1. Education and Awareness: Formal education | | SU1 | SU1, SU2, SU3 | SU1, SU2, SU3 |
| 4.2. | 4.2. Education and Awareness: Training | | SU1 | SU1, SU2, SU3 | SU1, SU2, SU3 |
| 4.3. | 4.3. Education and Awareness: Awareness & communications | | SU1 | SU1, SU2, SU3 | SU1, SU2, SU3 |
| 5.1.1. | 5.1.1. Legislation, International level | | | | |
| 5.1.2. | 5.1.2. Legislation, National level | | | | |
| 5.1.3. | 5.1.3. Legislation, Sub-national level | | | | SU1, SU2, SU3 |
| 5.1.4. | 5.1.4. Legislation, scale unspecified | | | | SU1, SU2, SU3 |
| 5.2. | 5.2. Policies and regulations | | | | |
| 5.3. | 5.3. Private sector standards & codes | | | | |
| 5.4.1. | 5.4.1. Compliance and enforcement- International level | | | | |
| 5.4.2. | 5.4.2. Compliance and enforcement- National level | | | SU1, SU2, SU3 | |
| 5.4.3. | 5.4.3. Compliance and enforcement- Sub-national level | | | | |
| 5.4.4. | 5.4.4. Compliance and enforcement- Scale unspecified | | | | |
| 6.1. | 6.1. Livelihood, economic & other incentives: Linked enterprises & livelihood alternatives | | | | |

| Classification | Full Description | Past actions (no longer occurring) | Current actions | Actions planned within 10 years | Actions that could be implemented in the long-term aspiration scenario |
|---|---|---|---|---|---|
| 6.2. | 6.2. Livelihood, economic & other incentives: Substitution | | | | |
| 6.3. | 6.3. Livelihood, economic & other incentives: Market forces | | | | |
| 6.4. | 6.4. Livelihood, economic & other incentives: Conservation payments | | | | |
| 6.5. | 6.5. Livelihood, economic & other incentives: Non-monetary values | | | | |

**Table S2.** Threats (list of threat codes) [SU1 = Mount Fansipan, SU2 = Mount Pu Ta Leng, and SU3 = Suitable habitat].

| Classification | Full Description | Past threats (no longer occurring) | Current threats | Threats expected to emerge or continue over next 10 years | Threats that would be relevant in the long-term aspiration scenario |
|---|---|---|---|---|---|
| 1.1 | 1.1 Residential & commercial development: Housing & urban areas | | | | |
| 1.2 | 1.2 Residential & commercial development: Commercial & industrial areas | | | | |
| 1.3 | 1.3 Residential & commercial development: Tourism & recreation areas | | SU1, SU2 | SU2, SU3 | SU1, SU2, SU3 |
| 2.1.1 | 2.1.1 Agriculture & aquaculture: Annual & perennial non-timber crops: Shifting agriculture | | | | |
| 2.1.2 | 2.1.2 Agriculture & aquaculture: Annual & perennial non-timber crops: Small-holder farming | | SU1, SU2 | SU3 | SU1, SU2, SU3 |
| 2.1.3 | 2.1.3 Agriculture & aquaculture: Annual & perennial non-timber crops: Agro-industry farming | | SU1, SU2 | SU3 | SU1, SU2, SU3 |
| 2.1.4 | 2.1.4 Agriculture & aquaculture: Annual & perennial non-timber crops: Scale Unknown/Unrecorded | | | | |
| 2.2.1 | 2.2.1 Agriculture & aquaculture: Wood & pulp plantations: Small-holder plantations | | | | |

| Classification | Full Description | Past threats (no longer occurring) | Current threats | Threats expected to emerge or continue over next 10 years | Threats that would be relevant in the long-term aspiration scenario |
|---|---|---|---|---|---|
| 2.2.2 | 2.2.2 Agriculture & aquaculture: Wood & pulp plantations: Agro-industry plantations | | | | |
| 2.2.3 | 2.2.3 Agriculture & aquaculture: Wood & pulp plantations: Scale Unknown/Unrecorded | | | | |
| 2.3.1 | 2.3.1 Agriculture & aquaculture: Livestock farming & ranching: Nomadic grazing | | | | |
| 2.3.2 | 2.3.2 Agriculture & aquaculture: Livestock farming & ranching: Small-holder grazing, ranching or farming | | SU1, SU2, SU3 | SU2 | SU1, SU2, SU3 |
| 2.3.3 | 2.3.3 Agriculture & aquaculture: Livestock farming & ranching: Agro-industry grazing, ranching or farming | | | | |
| 2.3.4 | 2.3.4 Agriculture & aquaculture: Livestock farming & ranching: Scale Unknown/Unrecorded | | | | |
| 2.4.1 | 2.4.1 Agriculture & aquaculture: Marine & freshwater aquaculture: Subsistence/artisanal aquaculture | | | | |
| 2.4.2 | 2.4.2 Agriculture & aquaculture: Marine & freshwater | | | | |

| Classification | Full Description | Past threats (no longer occurring) | Current threats | Threats expected to emerge or continue over next 10 years | Threats that would be relevant in the long-term aspiration scenario |
|---|---|---|---|---|---|
| | aquaculture: Industrial aquaculture | | | | |
| 2.4.3 | 2.4.3 Agriculture & aquaculture: Scale Unknown/Unrecorded | | | | |
| 3.1 | 3.1 Energy production & mining: Oil & gas drilling | | | | |
| 3.2 | 3.2 Energy production & mining: Mining & quarrying | | | | |
| 3.3 | 3.3 Energy production & mining: Renewable energy | | | | |
| 4.1 | 4.1 Transportation & service corridors: Roads & railroads | | | | |
| 4.2 | 4.2 Transportation & service corridors: Utility & service lines | | | SU1, SU2, SU3 | SU1, SU2, SU3 |
| 4.3 | 4.3 Transportation & service corridors: Shipping lanes | | | | |
| 4.4 | 4.4 Transportation & service corridors: Flight paths | | | | |
| 5.1.1 | 5.1.1 Biological resource use: Hunting & collecting terrestrial animals: Intentional use (species being assessed is the target) | | | | |
| 5.1.2 | 5.1.2 Biological resource use: Hunting & collecting terrestrial animals: Unintentional effects (species being assessed is not the target) | | | | |

| Classification | Full Description | Past threats (no longer occurring) | Current threats | Threats expected to emerge or continue over next 10 years | Threats that would be relevant in the long-term aspiration scenario |
|---|---|---|---|---|---|
| 5.1.3 | 5.1.3 Biological resource use: Hunting & collecting terrestrial animals: Persecution/control | | | | |
| 5.1.4 | 5.1.4 Biological resource use: Hunting & collecting terrestrial animals: Motivation Unknown/Unrecorded | | | | |
| 5.2.1 | 5.2.1 Biological resource use: Gathering terrestrial plants: Intentional use (species being assessed is the target) | | | | |
| 5.2.2 | 5.2.2 Biological resource use: Gathering terrestrial plants: Unintentional effects (species being assessed is not the target) | | | | |
| 5.2.3 | 5.2.3 Biological resource use: Gathering terrestrial plants: Persecution/control | | | | |
| 5.2.4 | 5.2.4 Biological resource use: Gathering terrestrial plants: Motivation Unknown/Unrecorded | | | | |
| 5.3.1 | 5.3.1 Biological resource use: Logging & wood harvesting: Intentional use: subsistence/small scale (species being assessed is the target [harvest] | | | | |

| Classification | Full Description | Past threats (no longer occurring) | Current threats | Threats expected to emerge or continue over next 10 years | Threats that would be relevant in the long-term aspiration scenario |
|---|---|---|---|---|---|
| 5.3.2 | 5.3.2 Biological resource use: Logging & wood harvesting: Intentional use: large scale (species being assessed is the target)[harvest] | | | | |
| 5.3.3 | 5.3.3 Biological resource use: Logging & wood harvesting: Unintentional effects: subsistence/small scale (species being assessed is not the target)[harvest] | | | | |
| 5.3.4 | 5.3.4 Biological resource use: Logging & wood harvesting: Unintentional effects: large scale (species being assessed is not the target)[harvest] | | | | |
| 5.3.5 | 5.3.5 Biological resource use: Logging & wood harvesting: Motivation Unknown/Unrecorded | | | | |
| 5.4.1 | 5.4.1 Biological resource use: Fishing & harvesting aquatic resources: Intentional use: subsistence/small scale (species being assessed is the target)[harvest] | | | | |
| 5.4.2 | 5.4.2 Biological resource use: Fishing & harvesting aquatic resources: Intentional use: large | | | | |

| Classification | Full Description | Past threats (no longer occurring) | Current threats | Threats expected to emerge or continue over next 10 years | Threats that would be relevant in the long-term aspiration scenario |
|---|---|---|---|---|---|
| | scale (species being assessed is the target)[harvest] | | | | |
| 5.4.3 | 5.4.3 Biological resource use: Fishing & harvesting aquatic resources: Unintentional effects: subsistence/small scale (species being assessed is not the target)[harvest] | | SU2 (tadpole collection for food) | SU2 | SU2 |
| 5.4.4 | 5.4.4 Biological resource use: Fishing & harvesting aquatic resources: Unintentional effects: large scale (species being assessed is not the target)[harvest] | | | | |
| 5.4.5 | 5.4.5 Biological resource use: Fishing & harvesting aquatic resources: Persecution/control | | | | |
| 5.4.6 | 5.4.6 Biological resource use: Fishing & harvesting aquatic resources: Motivation Unknown/Unrecorded | | | | |
| 6.1 | 6.1 Human intrusions & disturbance: Recreational activities | | SU1, SU2, SU3 | SU1, SU2, SU3 | SU1, SU2, SU3 |
| 6.2 | 6.2 Human intrusions & disturbance: War, civil unrest & military exercises | | | | |

| Classification | Full Description | Past threats (no longer occurring) | Current threats | Threats expected to emerge or continue over next 10 years | Threats that would be relevant in the long-term aspiration scenario |
|---|---|---|---|---|---|
| 6.3 | 6.3 Human intrusions & disturbance: Work & other activities | | | | |
| 7.1.1 | 7.1.1 Natural system modifications: Fire & fire suppression: Increase in fire frequency/intensity | | SU1 | SU1, SU2, SU3 | SU1, SU2, SU3 |
| 7.1.2 | 7.1.2 Natural system modifications: Fire & fire suppression: Suppression in fire frequency/intensity | | | | |
| 7.1.3 | 7.1.3 Natural system modifications: Fire & fire suppression: Trend Unknown/Unrecorded | | | | |
| 7.2.1 | 7.2.1 Natural system modifications: Dams & water management/use: Abstraction of surface water (domestic use) | | | | |
| 7.2.2 | 7.2.2 Natural system modifications: Dams & water management/use: Abstraction of surface water (commercial use) | | | | |
| 7.2.3 | 7.2.3 Natural system modifications: Dams & water management/use: Abstraction of surface water (agricultural use) | | SU1, SU2 | SU1, SU2 | SU1, SU2 |

| Classification | Full Description | Past threats (no longer occurring) | Current threats | Threats expected to emerge or continue over next 10 years | Threats that would be relevant in the long-term aspiration scenario |
|---|---|---|---|---|---|
| 7.2.4 | 7.2.4 Natural system modifications: Dams & water management/use: Abstraction of surface water (unknown use) | | | | |
| 7.2.5 | 7.2.5 Natural system modifications: Dams & water management/use: Abstraction of ground water (domestic use) | | | | |
| 7.2.6 | 7.2.6 Natural system modifications: Dams & water management/use: Abstraction of ground water (commercial use) | | | | |
| 7.2.7 | 7.2.7 Natural system modifications: Dams & water management/use: Abstraction of ground water (agricultural use) | | | | |
| 7.2.8 | 7.2.8 Natural system modifications: Dams & water management/use: Abstraction of ground water (unknown use) | | | | |
| 7.2.9 | 7.2.9 Natural system modifications: Dams & water management/use: Small dams | | SU2 | SU1, SU2 | SU1, SU2, SU3 |
| 7.2.10 | 7.2.10 Natural system modifications: Dams & water management/use: Large dams | | | | |
| 7.2.11 | 7.2.11 Natural system modifications: Dams & water | | | | |

| Classification | Full Description | Past threats (no longer occurring) | Current threats | Threats expected to emerge or continue over next 10 years | Threats that would be relevant in the long-term aspiration scenario |
|---|---|---|---|---|---|
| | management/use: Dams (size unknown) | | | | |
| 7.3 | 7.3 Natural system modifications: Other ecosystem modifications | | | | |
| 8.1.1 | 8.1.1 Invasive & other problematic species, genes & diseases: Invasive non-native/alien species/diseases: Unspecified species | | | | SU1, SU2, SU3 chytrid *Batrachochytrium dendrobatidis* present at site but no indication that this is currently having an impact on this species (Tapley et al., 2020b). However, the impacts of chytrid may change as climate changes and additional stressors are putt on this species (e.g. habitat modification, extreme weather events etc) The |

| Classification | Full Description | Past threats (no longer occurring) | Current threats | Threats expected to emerge or continue over next 10 years | Threats that would be relevant in the long-term aspiration scenario |
|---|---|---|---|---|---|
| | | | | | long term impact is unknown |
| 8.1.2 | 8.1.2 Invasive & other problematic species, genes & diseases: Invasive non-native/alien species/diseases: Named species | | | | |
| 8.2.1 | 8.2.1 Invasive & other problematic species, genes & diseases: Problematic native species/diseases: Unspecified species | | | | |
| 8.2.2 | 8.2.2 Invasive & other problematic species, genes & diseases: Problematic native species/diseases: Named species | | | | |
| 8.3 | 8.3 Invasive & other problematic species, genes & diseases: Introduced genetic material | | | | |
| 8.4.1 | 8.4.1 Invasive & other problematic species, genes & diseases: Problematic species/diseases of unknown origin: Unspecified species | | | | |
| 8.4.2 | 8.4.2 Invasive & other problematic species, genes & diseases: Problematic | | | | |

| Classification | Full Description | Past threats (no longer occurring) | Current threats | Threats expected to emerge or continue over next 10 years | Threats that would be relevant in the long-term aspiration scenario |
|---|---|---|---|---|---|
| | species/diseases of unknown origin: Named species | | | | |
| 8.5.1 | 8.5.1 Invasive & other problematic species, genes & diseases: Viral/prion-induced diseases: Unspecified "species" (disease) | | | | |
| 8.5.2 | 8.5.2 Invasive & other problematic species, genes & diseases: Viral/prion-induced diseases: Named "species" (disease) | | | | |
| 8.6 | 8.6 Invasive & other problematic species, genes & diseases: Diseases of unknown cause | | | | |
| 9.1.1 | 9.1.1 Pollution: Domestic & urban waste water: Sewage | | SU1, SU2 | SU1, SU2, SU3 | SU1, SU2, SU3 |
| 9.1.2 | 9.1.2 Pollution: Domestic & urban waste water: Run-off | | | | |
| 9.1.3 | 9.1.3 Pollution: Domestic & urban waste water: Type Unknown/Unrecorded | | | | |
| 9.2.1 | 9.2.1 Pollution: Industrial & military effluents: Oil spills | | | | |
| 9.2.2 | 9.2.2 Pollution: Industrial & military effluents: Seepage from mining | | SU1 | SU1, SU2, SU3 | SU1, SU2, SU3 |

| Classification | Full Description | Past threats (no longer occurring) | Current threats | Threats expected to emerge or continue over next 10 years | Threats that would be relevant in the long-term aspiration scenario |
|---|---|---|---|---|---|
| 9.2.3 | 9.2.3 Pollution: Industrial & military effluents: Type Unknown/Unrecorded | | | | |
| 9.3.1 | 9.3.1 Pollution: Agricultural & forestry effluents: Nutrient loads | | | | |
| 9.3.2 | 9.3.2 Pollution: Agricultural & forestry effluents: Soil erosion, sedimentation | | | | |
| 9.3.3 | 9.3.3 Pollution: Agricultural & forestry effluents: Herbicides & pesticides | | | | |
| 9.3.4 | 9.3.4 Pollution: Agricultural & forestry effluents: Type Unknown/Unrecorded | | | | |
| 9.4 | 9.4 Pollution: Garbage & solid waste | | SU1 | SU1, SU2, SU3 | SU1, SU2, SU3 |
| 9.5.1 | 9.5.1 Pollution: Air-borne pollutants: Acid rain | | | | |
| 9.5.2 | 9.5.2 Pollution: Air-borne pollutants: Smog | | | | |
| 9.5.3 | 9.5.3 Pollution: Air-borne pollutants: Ozone | | | | |
| 9.5.4 | 9.5.4 Pollution: Air-borne pollutants: Type Unknown/Unrecorded | | | | |
| 9.6.1 | 9.6.1 Pollution: Excess energy: Light pollution | | | | |

| Classification | Full Description | Past threats (no longer occurring) | Current threats | Threats expected to emerge or continue over next 10 years | Threats that would be relevant in the long-term aspiration scenario |
|---|---|---|---|---|---|
| 9.6.2 | 9.6.2 Pollution: Excess energy: Thermal pollution | | | | |
| 9.6.3 | 9.6.3 Pollution: Excess energy: Noise pollution | | | | |
| 9.6.4 | 9.6.4 Pollution: Excess energy: Type Unknown/Unrecorded | | | | |
| 10.1 | 10.1 Geological events: Volcanoes | | | | |
| 10.2 | 10.2 Geological events: Earthquakes/tsunamis | | | | |
| 10.3 | 10.3 Geological events: Avalanches/landslides | | | | |
| 11.1 | 11.1 Climate change & severe weather: Habitat shifting & alteration | | SU1, SU2, SU3 | SU1, SU2, SU3 | SU1, SU2, SU3 |
| 11.2 | 11.2 Climate change & severe weather: Droughts | | | | |
| 11.3 | 11.3 Climate change & severe weather: Temperature extremes | | SU!, SU2, SU3 | SU1, SU2, SU3 | SU1, SU2, SU3 |
| 11.4 | 11.4 Climate change & severe weather: Storms & flooding | | | | |
| 11.5 | 11.5 Climate change & severe weather: Other impacts | | | | |
| 12.1 | 12.1 Other threat | | | | |

## References

IUCN SSC Amphibian Specialist Group. 2021. *Oreolalax sterlingae.* The IUCN Red List of Threatened Species 2021(3): e.T76491633A87995169. https://dx.doi.org/10.2305/IUCN.UK.2021-3.RLTS.T76491633A87995169.en.

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Tapley, B., Jervis, P., Nguyen, L.T., Portway, C., Nguyen, C.T., Luong, H.V., Kane, D., Brookes, L., Perkins, M.W., Ghosh, P., Wierzbicki, C., Shelton, J., Fisher, M.C., Rowley, J.J.L. 2020b. Low prevalence of *Batrachochytrium dendrobatidis* detected in amphibians from Vietnam's highest mountains. *Herpetological Review*. 51: 726–732.

**Appendix 1.** Assessor Self-Review

1. **Disclose any potential conflicts of interest which could bias the assessment**.
   I currently work on this species with my colleagues in Viet Nam and Australia and we are currently working with Hoang Lien National Park to recommend that management practices are changed so that the habitat for this species is not further degraded.

2. **Is there any discrepancy between this assessment and the Red List assessment for the species? If so, comment on the likely reason for this discrepancy.**
   No

3. **Review the impact that you assigned to the various threats and conservation actions. Would the trajectory of the species be very different if other choices were made? If so, review your justification for these choices. If appropriate, widen the bounds on tabs 4 and 5-8 (change the lower and upper plausible values) to reflect the uncertainty introduced by the possibility of these other choices. How, if at all, did this review question cause this assessment to change? If no changes were needed, please write "no changes".**
   No changes.