## Species in the *In Situ* Conservation Role

**58 species**

Species for which mitigation of threats in the wild may still bring about their successful conservation.

| Species | Threat Mitigation | Protected Habitat | Comments |
|---|---|---|---|
| *Anaxyrus houstonensis* | Threats cannot/will not be reversed in time | No | Crump/Gluesenkamp - education will be important to get private landowners to help, TPWD student program in place & youth Toad Trackers (Houston Zoo) |
| *Plethodon ainsworthi* | Threats cannot/will not be reversed in time | No | Extinct species - but we evaluated it with the understanding that if it reappears; education warranted, if rediscovery; Dodd - distinctive morphologically - elongated and skinny. |
| *Ambystoma californiense* | Threats cannot/will not be reversed in time | No | Lannoo - new threat is genetic pollution from introduced tiger salamanders; Gluesenkamp- extirpation includes fish in stock pools; Gluesenkamp mentions that hybridized specimens could be culled from ponds. Gluesenkamp - bred by Brad Schaffer (now at UCLA); Gluesenkamp- "Poster child" for loss of Valley ecosystems. |
| *Cryptobranchus alleganiensis* | Threats are reversible in time frame | No | bishopi needs to be pulled out as a full species and has been federally listed as Endangered (Weir said check with Jeff Briggler in Missouri) and the eastern populations are not doing well either; Phillips - St Louis Zoo has noted the captive issue low sperm motility (water quality issues per Mark Wanner); unique based on phylogenetic uniqueness and is large (3rd largest salamander species); cultural history high profile in Appalachia & Ozarks - All; historically collected/eradicated - now elevated to Appendix 1 to reduce this; C. allagenensis is a good analog for bishopi; educate fishermen that they do not compete for fish/shouldn't be killed during gigging practices per Phillips; phylogenetics still inconclusive per Phillips. |
| *Eurycea rathbuni* | Threats are reversible in time frame | Yes | Chippendale/Gluesenkamp/Chamberlin - southern Edwards' Plateau, lives under the range of nana; potential habitat reintroduction at Wonder Cave (part of natural range); exceptionally extreme trogolbite in Amphibia (more than olm in our opinion!); cultural - on beer/wine, research ; analog for waterlooensis and robusta; Education for Edwards Aquifer biodiversity (flagship) |
| *Necturus alabamensis* | Threats are reversible in time frame | No | Keyster keeping them (using beyeri as an analog) with intention of program. |
| *Gyrinophilus gulolineatus* | Threats are reversible in time frame | No | In captivity at UTENN & Knoxville Zoo (Nate Haislip - FWZ). |
| *Phaeognathus hubrichti* | Threats are reversible in time frame | No | Local regional species - increase awareness of its fossorial presence. |

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| *Necturus lewisi* | Threats are reversible in time frame | No | Lannoo - accumulates PCB toxins; rapidly urbanizing areas (siltation, etc.) per Dodd. |
| *Lithobates areolatus* | Threats are reversible in time frame | Yes | Lannoo - one of the most secretive frogs in NA, undergoing a recent & precipitous decline; Obligate requires another species makes it biologically exceptional - All; cryptic species for grassland and conservation efforts for education; Lannoo - state endangered in IN and IA, and special concern in KS, few populations throughout rest of range. |
| *Anaxyrus californicus* | Threats are reversible in time frame | Yes | Becklin - invasive species and habitat loss as threats. |
| *Anaxyrus canorus* | Threats are reversible in time frame | Yes | Becklin - Bd issues, drought, others? (Adam ask Gary Fellers & Vance Vredenberg - in CA about threats & mandates for ex situ); potentially involved in the taxonomic evaluation of exsul per Dodd. |
| *Anaxyrus nelsoni* | Threats are reversible in time frame | Yes | Hassack - threats from off-road vehicles; Dodd - fewer than 2,000 individuals per Simandle; Philips says this species is similar to exsul (so taxonomic review is likely). |
| *Lithobates onca* | Threats are reversible in time frame | Yes | |
| *Rana muscosa* | Threats are reversible in time frame | Yes | Becklin - species was split in 2007 into sierrae (southern) & muscosa (northern range); largest declines in muscosa is federally endangered in CA, but the rest of the range is; sierrae is state listed and candidate for federal listing (Grow); main threat is Bd and invasive species; already in captivity with husbandry in progress, so can be used as an analog for other high elevation ranid species (cascase and sierrae); education for species awareness support for conservation of species. |
| *Rana sierrae* | Threats are reversible in time frame | Yes | Becklin - translocations to a novel site within range; Vredenburg has had them in the lab for a while; education for species awareness support for conservation of species. |
| *Spea hammondii* | Threats are reversible in time frame | No | Becklin - being held by many private individuals. |
| *Plethodon welleri* | Threats are reversible in time frame | Yes | |
| *Urspelerpes brucei* | Threats are reversible in time frame | Yes | Newly recognized species; extremely rare - highly endangered; known an 8.5km2 area in Stephens Co., GA and Oconee Co, SC; stream dwellers. (Post workshop: I have a small group of Urspelerpes brucei at home, also recently collected (still bait in GA). They are doing well, though most are larvae. Todd Pierson and Carlos Camp are analyzing eDNA samples as we speak and hopefully with detect a broader distribution. Tim Herman, pers. comm. Oct 2013). |
| *Notophthalmus meridionalis* | Threats are reversible in time frame | No | Gluesenkamp - awareness and overall pond and rosacas habitat protection on private property; ANDYG - confirm with Gabrielle Parras about phylogenetics. |

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| *Amphiuma pholeter* | Threats are reversible in time frame | No | Phillips - basic life history lacking; phylogenetics have been completed. (1) animal in captivity at Philly Zoo per ISIS. |
| *Gyrinophilus palleucus* | Threats are reversible in time frame | No | |
| *Pseudacris illinoensis* | Threats are reversible in time frame | No | Exceptional because it uses forelimbs for burrowing (only 4 species including streckeri and two in Africa). |
| *Anaxyrus exsul* | Threats are reversible in time frame | Yes | Dodd - some populations found by Richard Tracy (UN - Reno) to expand range; Lannoo - Deep Springs College performing management work (grazing); culturally important as entire range on college grounds. The animal is on a beer bottle label so may have some cultural significance (Barber). |
| *Lithobates capito* | Threats are reversible in time frame | Yes | Analog for L. sevosa; captive reared, but no knowledge of being bred within group; life-cycle education for species awareness; Lannoo - in process for being petitioned. |
| *Lithobates chiricahuensis* | Threats are reversible in time frame | No | Barber - suggests that this species be re-evaluated fully; education - local awareness for conservation efforts (in place). |
| *Lithobates tarahumarae* | Threats are reversible in time frame | No | Has been reintroduced per Dodd; also occurs within Mexico. |
| *Eurycea junaluska* | Threats are reversible in time frame | Yes | Dodd - it's lowland within Great Smoky Mountains; U Tennessee keeping these. |
| *Eurycea sosorum* | Threats are reversible in time frame | Yes | Chippendale/Gluesenkamp/Chamberlain - southern Edwards' Plateau; impervious cover limits within county; cultural - locally recognized species; analog for others within southern complex; needs more outreach to help awareness (water quality, species issues). |
| *Eurycea tonkawae* | Threats are reversible in time frame | Yes | Chippendale/Gluesenkamp/Chamberlain - northern Edwards' Plateau; Scientifically important - skeletal resorption (hormone leptin impacting osteoporosis), which may make it exceptional as it's only one know to shrink/grow on own. |
| *Eurycea waterlooensis* | Threats are reversible in time frame | Yes | Chippendale/Gluesenkamp/Chamberlain - southern Edwards' Plateau; lives under the range of E. sosorum; water quality threats are reversible per Chamberlian; exceptional as troglobites (along with rathbuni); locally culturally important; Education - local aquifer, unique biology within range, diversity. |
| *Notophthalmus perstriatus* | Threats are reversible in time frame | Yes | |
| *Aneides ferreus* | Threats are reversible in time frame | Yes | Hassock - largely on harvested forestlands; Needs mitigation of logging practices - all. |
| *Aneides flavipunctatus* | Threats are reversible in time frame | No | Threats include vineyards. |
| *Aneides hardii* | Threats are reversible in time frame | Yes | Fire management would be helpful - Lannoo. |

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| *Aneides vagrans* | Threats are reversible in time frame | Yes | Similar to ferreus and largely on harvested forestlands; in private sector (Russ Cormack). |
| *Desmognathus aeneus* | Threats are reversible in time frame | No | |
| *Desmognathus wrighti* | Threats are reversible in time frame | Yes | Dodd - climate change potential impacts; Dodd - and could have been broken up into two species (northern - aka D. organi and southern as D wrighti); analog for organi.(Post workshop: I do know that D. wrighti was bred by a hobbyist, and I recently collected a small group to work with at home. I've bred D. aeneus at home for several generations and from what I've heard the care is similar. They are syntopic at one site in Macon Co., NC. Tim Herman, pers. comm. Oct 2013). |
| *Anaxyrus boreas* | Threats are reversible in time frame | Yes | Dodd - some populations found by Richard Tracy (UN - Reno) to expand range; in decline in south and east due to Bd; Analog for exsul; Glusenc - widely recognized as flagship for range (manageable); mandates are state specific. |
| *Anaxyrus quercicus* | Threats are reversible in time frame | No | Dodd - Dorcas noted habitat and breeding pond loss; Phillips - climate change also impacting this species. |
| *Rana boylii* | Threats are reversible in time frame | Yes | Ray Johnson's reintroduction project delayed (Becklin). |
| *Rana cascadae* | Threats are reversible in time frame | Yes | Grow - NW Climate group lists it as 3rd most at risk species; Hassock - decline in one drainage, but fine in Klamath and Trinity Alps (through most of range except at extreme edges). |
| *Eurycea spelaea* | Threats are reversible in time frame | No | Exceptional because noted recently to consume bat guano - so only coprophagic amphibian! Larval are surface and go back into caves as adults (and grow skin over eyes to protect them during life above ground); threats are water quality and non-native fish predators; this species may be split up per Chippendale. |
| *Eurycea troglodytes* | Threats are reversible in time frame | No | Chippendale/Gluesenkamp/Chamberlain - southern Edwards' Plateau; potential reintroduction site at Valadina Farms; phylogenetics within clade done, but probably will be split in future. |
| *Eurycea robusta* | Threats are reversible in time frame | No | Chippendale/Gluesenkamp/Chamberlin - southern Edwards' Plateau; known from very few specimens which hasn't been seen in a while; exceptional because of extreme troglobitism. |
| *Eurycea wallacei* | Threats are reversible in time frame | No | Weir - noted genus has been updated to Haideotriton, but it may not be recognized; Dodd - one of the blind group makes it exceptional; Education - local awareness campaign. |

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| *Plethodon wehrlei* | Threats are reversible in time frame | No | Warrants phylogenetic work (Lannoo); hydrofracking impacting habitat loss; Barrett questioned that some would be impacted, but across the range would be fine (and we have been mostly consistent with this unless an isolated critical species). |
| *Plethodon ventralis* | Threats are reversible in time frame | No | |
| *Plethodon websteri* | Threats are reversible in time frame | No | Adapted to threats per NatureServe.org (Barber) |
| *Eurycea chisholmensis* | Threats are reversible in time frame | No | Chippendale/Gluesenkamp/Chamberlain - known from (6) populations per Gluesenkamp; This Genera can also be considered so tied to its localized habitat such that they would only displace another of the same genus if introduced in other nearby areas (so reintroduction may not be warranted unless they were originally known from those springs); Dallas Zoo has them but has not had breeding success yet; Education might help with awareness (Gluesenkamp has attempted for past 3 years, but needs more help). Chippendale - this is part of the northern group from Edwards plateau. |
| *Eurycea latitans* | Threats are reversible in time frame | No | Chippendale/Gluesenkamp/Chamberlain - potentially could be lumped together (with tridentifera) based on additional pending phylogenetic research; southern Edwards' Plateau. |
| *Eurycea nana* | Threats are reversible in time frame | Yes | Chippendale/Gluesenkamp/Chamberlain - southern Edwards' Plateau; analog for the southern clade complex; education for flagship spring species within range (endangered plants, inverts, fish, salamanders all on university property); bred heavily at San Marcos Fed. Fish Hatchery. |
| *Eurycea naufragia* | Threats are reversible in time frame | No | Chippendale/Gluesenkamp/Chamberlain - northern Edwards' Plateau; is most likely two species. |
| *Eurycea neotenes* | Threats are reversible in time frame | No | Chippendale/Gluesenkamp/Chamberlain - Dallas Zoo bred this species and at San Marcos Fed Fish Hatchery so would make good analog for the southern clade complex; southern Edwards' Plateau. |
| *Eurycea pterophila* | Threats are reversible in time frame | No | Chippendale/Gluesenkamp/Chamberlain - southern Edwards' Plateau. |
| *Eurycea tridentifera* | Threats are reversible in time frame | No | Chippendale/Gluesenkamp/Chamberlain - southern Edwards' Plateau; maintained at Detroit Zoo; likely to be subsumed into latitans based on pending phylogenetic work. |
| *Plethodon sherando* | Threats are reversible in time frame | Yes | Kast - only discovered in 2004. |
| *Eurycea tynerensis* | Threats are reversible in time frame | No | Being maintained in Europe; Ron Bonnet may have more input for this evaluation species, so Ask Ron. |