

Response to Global Warming of Eichwald's Toad, *Bufo eichwaldi* Litvinchuk, Borkin, Skorinov and Rosanov, 2008 (Anura; Amphibia) in Iran and Azerbaijan

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Occurrence records of *Bufo eichwaldi* throughout the whole distribution range in Iran and Azerbaijan, used in this study.

Taxon	Latitude	Longitude	Source
<i>Bufo eichwaldi</i>	37.910009	48.965326	this study
<i>Bufo eichwaldi</i>	37.285928	49.027922	this study
<i>Bufo eichwaldi</i>	36.97	55.03	this study
<i>Bufo eichwaldi</i>	38.65	48.8	this study
<i>Bufo eichwaldi</i>	38.65	48.8	this study
<i>Bufo eichwaldi</i>	38.65	48.8	this study
<i>Bufo eichwaldi</i>	38.673	48.644	this study
<i>Bufo eichwaldi</i>	36.052712	53.042088	this study
<i>Bufo eichwaldi</i>	36.115481	53.053799	this study
<i>Bufo eichwaldi</i>	36.074665	53.030217	this study
<i>Bufo eichwaldi</i>	36.180561	53.084799	this study
<i>Bufo eichwaldi</i>	36.007062	53.138036	this study
<i>Bufo eichwaldi</i>	36.040654	53.188485	this study
<i>Bufo eichwaldi</i>	37.084942	55.17945	this study
<i>Bufo eichwaldi</i>	37.109332	55.075251	this study
<i>Bufo eichwaldi</i>	37.109054	55.10508	this study
<i>Bufo eichwaldi</i>	37.009751	55.006598	this study
<i>Bufo eichwaldi</i>	37.96621	48.988764	this study
<i>Bufo eichwaldi</i>	37.985656	48.875152	this study
<i>Bufo eichwaldi</i>	37.063493	55.091501	this study
<i>Bufo eichwaldi</i>	37.199378	55.179732	this study
<i>Bufo eichwaldi</i>	37.030325	55.091068	this study
<i>Bufo eichwaldi</i>	37.164822	55.00251	this study
<i>Bufo eichwaldi</i>	37.941203	48.897399	this study
<i>Bufo eichwaldi</i>	38.65	48.8	this study
<i>Bufo eichwaldi</i>	38.65	48.8	this study
<i>Bufo eichwaldi</i>	36.625132	53.425682	this study
<i>Bufo eichwaldi</i>	38.5167	48.7833	this study
<i>Bufo eichwaldi</i>	38.7667	48.75	this study
<i>Bufo eichwaldi</i>	38.7667	48.75	this study
<i>Bufo eichwaldi</i>	38.6833	48.7333	this study
<i>Bufo eichwaldi</i>	38.5167	48.7833	this study
<i>Bufo eichwaldi</i>	38.45	48.7333	this study
<i>Bufo eichwaldi</i>	38.5333	48.7833	this study

Taxon	Latitude	Longitude	Source
<i>Bufo eichwaldi</i>	38.6667	48.7667	this study
<i>Bufo eichwaldi</i>	38.8	48.4333	this study
<i>Bufo eichwaldi</i>	38.6667	48.7667	this study
<i>Bufo eichwaldi</i>	38.8	48.7167	this study
<i>Bufo eichwaldi</i>	38.5167	48.7833	this study
<i>Bufo eichwaldi</i>	38.6667	48.7667	this study
<i>Bufo eichwaldi</i>	38.5333	48.7833	this study
<i>Bufo eichwaldi</i>	38.7667	48.75	this study
<i>Bufo eichwaldi</i>	38.8	48.4333	this study
<i>Bufo eichwaldi</i>	38.6833	48.7667	this study
<i>Bufo eichwaldi</i>	38.5333	48.7833	this study
<i>Bufo eichwaldi</i>	38.45	48.7333	this study
<i>Bufo eichwaldi</i>	38.5333	48.65	this study
<i>Bufo eichwaldi</i>	38.45	48.7	this study
<i>Bufo eichwaldi</i>	38.5	48.7	this study
<i>Bufo eichwaldi</i>	38.5	48.7	this study
<i>Bufo eichwaldi</i>	38.6667	48.7667	this study
<i>Bufo eichwaldi</i>	38.8	48.75	this study
<i>Bufo eichwaldi</i>	38.7667	48.7667	this study
<i>Bufo eichwaldi</i>	38.5333	48.65	this study
<i>Bufo eichwaldi</i>	38.8	48.7333	this study
<i>Bufo eichwaldi</i>	38.5	48.7167	this study
<i>Bufo eichwaldi</i>	38.5333	48.7833	this study
<i>Bufo eichwaldi</i>	38.5	48.7667	this study
<i>Bufo eichwaldi</i>	38.5333	48.65	this study
<i>Bufo eichwaldi</i>	38.7667	48.8167	this study
<i>Bufo eichwaldi</i>	38.45	48.7	this study
<i>Bufo eichwaldi</i>	38.6833	48.7667	this study
<i>Bufo eichwaldi</i>	38.5	48.7667	this study
<i>Bufo eichwaldi</i>	38.7667	48.8167	this study
<i>Bufo eichwaldi</i>	38.45	48.7	this study
<i>Bufo eichwaldi</i>	38.7667	48.7167	this study
<i>Bufo eichwaldi</i>	38.5	48.7667	this study
<i>Bufo eichwaldi</i>	38.7833	48.3833	this study
<i>Bufo eichwaldi</i>	38.65	48.75	this study
<i>Bufo eichwaldi</i>	39.2	48.5167	this study
<i>Bufo eichwaldi</i>	38.6667	48.6333	this study
<i>Bufo eichwaldi</i>	38.9667	48.9333	this study
<i>Bufo eichwaldi</i>	38.7667	48.8167	this study
<i>Bufo eichwaldi</i>	38.7667	48.7667	this study
<i>Bufo eichwaldi</i>	38.6667	48.7667	this study
<i>Bufo eichwaldi</i>	38.7667	48.8167	this study
<i>Bufo eichwaldi</i>	39.0333	48.55	this study
<i>Bufo eichwaldi</i>	38.8	48.7167	this study
<i>Bufo eichwaldi</i>	39.2	48.5167	this study
<i>Bufo eichwaldi</i>	38.9667	48.4	this study
<i>Bufo eichwaldi</i>	38.5333	48.7833	this study

Taxon	Latitude	Longitude	Source
<i>Bufo eichwaldi</i>	37.156158	55.083057	this study
<i>Bufo eichwaldi</i>	39.181	48.477	Nikolsky, 1913
<i>Bufo eichwaldi</i>	38.901	48.309	Iskanderov, 2009
<i>Bufo eichwaldi</i>	38.947	48.667	Iskanderov, 2009
<i>Bufo eichwaldi</i>	38.973	48.681	Iskanderov, 2009
<i>Bufo eichwaldi</i>	38.77	48.41	Litvinchuk et al., 2008
<i>Bufo eichwaldi</i>	38.79	48.469	Gasimova and Ganiyev, 2011
<i>Bufo eichwaldi</i>	38.751	48.53	Kidov and Matushkina, 2012
<i>Bufo eichwaldi</i>	38.682	48.627	Kidov and Matushkina, 2012
<i>Bufo eichwaldi</i>	38.654	48.625	Recuero et al., 2012
<i>Bufo eichwaldi</i>	38.701	48.631	Kidov and Serbinova, 2008
<i>Bufo eichwaldi</i>	38.88	48.8	Gasimova and Ganiyev, 2011
<i>Bufo eichwaldi</i>	38.884	48.88	Alekperov, 1951
<i>Bufo eichwaldi</i>	38.8	48.762	Kidov and Serbinova, 2008
<i>Bufo eichwaldi</i>	38.76	48.762	Veliyeva, 1981
<i>Bufo eichwaldi</i>	38.769	48.773	Alekperov, 1978
<i>Bufo eichwaldi</i>	38.756	48.816	Kidov and Serbinova, 2008
<i>Bufo eichwaldi</i>	38.729	48.701	Kidov and Serbinova, 2008
<i>Bufo eichwaldi</i>	38.731	48.648	Gasimova and Ganiyev, 2011
<i>Bufo eichwaldi</i>	38.68	48.748	Gasimova and Ganiyev, 2011
<i>Bufo eichwaldi</i>	38.71	48.8	Matushkina, 2016
<i>Bufo eichwaldi</i>	38.66	48.722	Litvinchuk et al., 2008
<i>Bufo eichwaldi</i>	38.65	48.801	Iskanderov, 2009
<i>Bufo eichwaldi</i>	38.641	48.811	Iskanderov, 2009
<i>Bufo eichwaldi</i>	38.63	48.79	Gasimova and Ganiyev, 2011
<i>Bufo eichwaldi</i>	38.66	48.78	Gasimova and Ganiyev, 2011
<i>Bufo eichwaldi</i>	38.61	48.809	Iskanderov, 2009
<i>Bufo eichwaldi</i>	38.589	48.792	Matushkina and Kidov, 2013
<i>Bufo eichwaldi</i>	38.58	48.818	Iskanderov, 2009
<i>Bufo eichwaldi</i>	38.532	48.783	Kidov et al., 2009
<i>Bufo eichwaldi</i>	38.525	48.794	Kidov et al., 2011
<i>Bufo eichwaldi</i>	38.491	48.634	Kidov and Serbinova, 2008
<i>Bufo eichwaldi</i>	38.5	48.63	Kidov and Matushkina, 2012
<i>Bufo eichwaldi</i>	38.5	48.83	Iskanderov, 2009
<i>Bufo eichwaldi</i>	38.44	48.721	Gasimova and Ganiyev, 2011
<i>Bufo eichwaldi</i>	38.449	48.75	Matushkina, 2016
<i>Bufo eichwaldi</i>	38.459	48.791	Iskanderov, 2009
<i>Bufo eichwaldi</i>	37.71405	48.93084444	Darvishnia et al., 2018
<i>Bufo eichwaldi</i>	37.82575556	48.95285278	Darvishnia et al., 2018
<i>Bufo eichwaldi</i>	38.18021667	48.89462778	Darvishnia et al., 2018
<i>Bufo eichwaldi</i>	38.33293333	48.85541944	Darvishnia et al., 2018
<i>Bufo eichwaldi</i>	37.38959167	49.24024167	Darvishnia et al., 2018
<i>Bufo eichwaldi</i>	37.57225278	49.14202778	Darvishnia et al., 2018
<i>Bufo eichwaldi</i>	37.43564722	49.16404167	Darvishnia et al., 2018
<i>Bufo eichwaldi</i>	37.76315278	48.933675	Darvishnia et al., 2018
<i>Bufo eichwaldi</i>	38.45	48.73333333	Darvishnia et al., 2018
<i>Bufo eichwaldi</i>	38.51666667	48.78333333	Darvishnia et al., 2018

Taxon	Latitude	Longitude	Source
<i>Bufo eichwaldi</i>	38.68333333	48.63333333	Darvishnia et al., 2018
<i>Bufo eichwaldi</i>	38.66666667	48.8	Darvishnia et al., 2018
<i>Bufo eichwaldi</i>	38.71505	48.8649	this study
<i>Bufo eichwaldi</i>	38.76826944	48.73615556	this study
<i>Bufo eichwaldi</i>	38.78483889	48.46932222	this study
<i>Bufo eichwaldi</i>	38.43489444	48.75597222	this study
<i>Bufo eichwaldi</i>	38.60104167	48.66117778	this study
<i>Bufo eichwaldi</i>	38.68344444	48.75380556	this study
<i>Bufo eichwaldi</i>	38.68341667	48.75	this study

References

- ALEKPEROV A. M. 1951. "Class Amphibians — Amphibia," in: Alizade A. N. et al. (eds.), *Animal World of Azerbaijan*, Izd. AN AzSSR, Baku, pp. 203 – 206 [in Russian].
- ALEKPEROV A. M. 1978. *Amphibians and Reptiles of Azerbaijan*, Baku [in Russian].
- DARVISHNIA H., FAHTINIA B., BAKHSHI Y. 2018. Notes on dietary habits and biology of the vulnerable species *Bufo eichwaldi* (Amphibia; Anura; Bufonidae) in Iran. *J. anim. biol.* 7: 55 – 61.
- GASIMOVA G. H., GANIYEV F. R. 2011. "Notes on distribution and protection of rare Amphibians of Azerbaijan," in: *Biological Museums. Role and Place in Scientific and Educational Expanse: Proc. of the All-Russian Scientific Conf.*, Makhachkala, pp. 93 – 97 [in Russian].
- ISKANDEROV T. 2009. "Current status of the Caucasus toad (*Bufo verrucosissimus* Pall., 1814) and Caucasus parsley frog (*Pelodytes caucasicus* Boul., 1896) in Azerbaijan," in: Zazanashvili N. and Mallon D. (eds.), *Status and Protection of Globally Threatened Species in the Caucasus: CEPF Biodiversity Investments in the Caucasus Hotspot 2004 – 2009*, Tbilisi, pp. 151 – 156.
- KIDOV A. A., MATUSHKINA K. A. 2012. "Vertical distribution of findings amphibians and reptiles of the Hyrcanian ecological and faunistic group in Azerbaijan," in: N. B. Ananjeva et al. (eds.), *The Problems of Herpetology: Proc. of the 5th Congress of the Alexander N. Nikolsky Herpetological Society*, Minsk, pp. 100 – 103 [in Russian].
- KIDOV A. A., SERBINOVA I. A. 2008. "Notes on biology of the Caucasian common toad, *Bufo verrucosissimus* (Pallas, [1814]) (Amphibia: Anura: Bufonidae) in the Talysh Mountains," in: L. A. Zhukova et al. (eds.), *Principles and Methods of Conservation of Biodiversity. Proc. of the 3th All-Russ. Conf.*, Pushchino, pp. 425 – 426 [in Russian].

- KIDOV A. A., MATUSHKINA K. A., TIMOSHINA A. L. 2011. “New distribution’s materials for amphibians and reptiles in the Talysh Mountains and the Lenkoran Lowland: some results of herpetological expeditions, 2009 – 2011,” Tr. Ukr. Gerpetol. Obshch., **3**: 56 – 63 [in Russian].
- LITVINCHUK S. N., BORKIN L. J., SKORINOV D. V., ROSANOV J. M. 2008. “A new species of common toads from the Talysh mountains, south-eastern Caucasus: genome size, allozyme, and morphological evidences,” Russ. J. Herpetol., **15**(1): 19 – 43.
- MATUSHKINA K. A. 2016. *Distribution, Variability, Ecology, and Conservation of the Talysh Toad (Bufo eichwaldi) in South-Western Precaspian Region. PhD Thesis*, Russian State Agrarian University, Moscow [in Russian].
- MATUSHKINA K. A., KIDOV A. A. 2013. “Breeding of the Talysh toad, *Bufo eichwaldi* Litvinchuk, Rosanov, Borkin et Skorinov, 2008 (Amphibia: Anura: Bufonidae) in mountains and foothills of Azerbaijani Talysh,” Vestn. Tambov Univ. Ser. Estestv. Tekhn. Nauki, **18**: 3042 – 3044 [in Russian].
- NIKOLSKY A. M. 1913. *Herpetologia Caucasica*, The Caucasian Museum, Tiflis [in Russian].
- RECUERO E., CANESTRELLI D., VÖRÖS J., SZABO K., POYARKOV N. A., ARNTZEN J. W., CRNOBRNJIA-ISAILOVIC J., KIDOV A. A., COGĂLNICEANU D., CAPUTO F. P., NASCETTI G., MARTINEZ-SOLANO I. 2012. “Multilocus species tree analyses resolve the radiation of the widespread *Bufo bufo* species group (Anura, Bufonidae),” Mol. Phyl. Evol., **62**(1): 71 – 86.
- VELIYEVA Z. D. 1981. “On new records and ecology of the common toad in Azerbaijan,” in: I. S. Darevsky et al. (eds.), Prob. Herpetol., Leningrad, pp. 30 – 31 [in Russian].