Review of the Chihuahua Catfish (*Ictalurus* sp. 1)

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Table of Contents

List of Figures

List of Tables

Executive Summary

The Chihuahua Catfish (*Ictalurus* sp. 1) is a putative species that has never been formally described in peer-reviewed literature as a valid taxonomic entity. A 1998 draft species description was never completed (Humphries and Miller 1998, entire; Hendrickson 2017, p. 3). The Chihuahua Catfish is morphologically similar to or indistinguishable from the Headwater (*I. lupus*) Catfish with which it would hypothetically be sympatric (Humphries and Miller 1998, pp. 4, 8). Most quantitative values for comparative morphological traits overlap for the Chihuahua and Headwater Catfishes (*I. lupus*) [Humphries and Miller 1998, p. 19]. Extensive surveys in New Mexico and Texas did not produce any evidence that the Chihuahua Catfish exists in either state (McClure-Baker et al. 2010, pp. 1,781-1,784; Parker et al. 2021, pp. 535-537, 539, 545). Genetic analyses have found no evidence for existence of a genetically distinct population in the United States or Mexico that would correspond with the purported range of the Chihuahua Catfish (McClure-Baker et al. 2010, pp. 1,781-1,784; Parker et al. 2021, pp. 535-537, 539, 545; Bean et al. 2022; Pérez-Rodríquez et al. 2022, pp. 15-20, 22, 32-35). A recent study did identify genetically differentiated populations of *Ictalurus* species (e.g., Headwater and Yaqui Catfishes [*I. pricei*]) that may represent undescribed species (Pérez-Rodríguez et al. 2022, pp. 7-22, 32-35). However, none of these populations were described as Chihuahua catfish (Pérez-Rodríguez et al. 2022, pp. 19-20, 32-33). To date, no peer-reviewed publications have directly addressed the taxonomic status of the Chihuahua Catfish or provided evidence of its existence as a distinct species. We have reviewed all the available information regarding the taxonomic status of the putative Chihuahua Catfish and conclude that there is insufficient credible scientific evidence that the entity qualifies as a valid species or subspecies.

1.0 Introduction

This report is a summary of information assembled and reviewed by the U.S. Fish and Wildlife Service (Service) regarding the taxonomic status of the Chihuahua Catfish (*Ictalurus* sp. 1). The Chihuahua Catfish is a purported undescribed species of freshwater catfish suggested to occur in the Rio Conchos of Mexico, Pecos River of New Mexico, Texas, and Mexico, and the Rio San Fernando of Mexico (Humphries and Miller 1998, pp. 1, 8-9, 26, 29).

2.0 Federal Actions

On June 25, 2007, the Service received a petition dated June 18, 2007, from Forest Guardians (now WildEarth Guardians) requesting that the Service list 475 species, including the Chihuahua Catfish (Forest Guardians 2007, p. 43), as a threatened or endangered species and designate critical habitat under the Endangered Species Act (Act). All 475 species occur within the Service's Southwestern Region and were ranked as G1 or G1G2 species by NatureServe at the time. On December 16, 2009, the Service published a partial 90-day finding for the Chihuahua Catfish stating that the petition presented substantial scientific information indicating that listing may be warranted (74 FR 66866). This report represents the Service's review of the best available information as to whether the Chihuahua Catfish is a listable entity under the Act

3.0 Taxonomy

The Chihuahua Catfish has never been formally described in peer-reviewed scientific literature. A draft species description, labeled "near complete draft" was developed by researchers from the University of New Orleans and University of Michigan in 1998 (Humphries and Miller 1998, entire; Hendrickson 2017, p. 3). The version of the document currently available is incomplete and annotated with handwritten and typed edits and notes by the authors (Humphries and Miller 1998, pp. 1, 3, 5-11, 15, 21, 23, 27-31). Humphries and Miller (1998, pp. 5, 10) assigned the putative catfish species the Latin name, *I. chihuahua* and the common name, Chihuahua Catfish. Delineation of the Chihuahua Catfish from co-occurring presumed congeners (i.e., Headwater (*I. lupus*) and Channel (*I. punctatus*) Catfishes) relied on morphological characters alone (Humphries and Miller 1998, pp. 3, 6-8, 19-22; Hendrickson 2017, p. 4).

Phylogenetic analyses were not conducted by Humphries and Miller (1998, entire). Hendrickson (2017, p. 24-27) describes the collection of tissue samples from eight catfish taken from the Chihuahua Catfish's type locality in Mexico and an individual fish from the East Fork Gila River in New Mexico. Some of these samples were subject to preliminary genetic analyses (i.e., cytochrome-b), the results of which remain unpublished (Hendrickson 2017, p. 26). A draft phylogenetic tree from Hendrickson (2017, p. 29-31) depicts some samples attributed to the Chihuahua Catfish grouping closely with Headwater Catfish. Samples from the Gila River grouped with Channel Catfish from that river, with Hendrickson (2017, p. 29, 31) stating that "some *I. chihuahua*-like specimens from the Gila basin have an *I. punctatus* Cyt-b haplotype (i.e., are likely hybrids)." There is documentation of hybridization between Headwater and Channel Catfishes and Yaqui (*I. pricei*) and Channel Catfishes based on mitochondrial and nuclear genetic analyses (McClure-Baker et al. 2010, pp. 1,788-1,790; Parker et al. 202, pp. 541-547; Gutiérrez-Barragán et al. 2021, pp. 3,337-3,339; Bean et al. 2022).

Criscitiello et al. (1998) compared partial cDNA (i.e., complementary DNA) sequences for β_2-microglobulin among Blue (*I. furcatus*), Channel, Chihuahua, and Headwater Catfishes. The Chihuahua and Headwater Catfish were nearly identical and differed only in intron sequences (Criscitiello et al. 1998, p. 341-342). A genetic and morphological assessment of Channel and Headwater Catfish in New Mexico and Texas by McClure-Baker et al. (2010, pp. 1,781-1,784) did not identify a distinct group that corresponded to the Chihuahua Catfish. An extensive phylogenetic study of North American Ictaluridae did not include assessment of the Chihuahua Catfish (Arch-H et al. 2017, entire).

Varela-Romero et al. (2020, pp. 288-289) documented genetic similarity of *Ictalurus* from the Rio Conchos system in Mexico with Headwater Catfish in San Felipe Creek in Texas. That researchers also noted the presence of an undescribed catfish species (i.e., *I. lupus*-like form) from the Rio Conchos system but did not attribute this potential new species to the Chihuahua Catfish (Williams et al. 1989, p. 6; Miller et al. 2009, p. 34; Varela-Romero et al. 2020, p. 289). Work by Bean et al. (2022) identified hybrids between the Headwater and Channel Catfishes at all sampled locations in New Mexico and Texas. There was no evidence from those genetic samples produced a distinct clade that would have corresponded to the Chihuahua Catfish (Bean et al. 2022). Pérez-Rodríguez et al. (2022, entire), in a preprint manuscript, examined the molecular phylogenetic relationships among *Ictalurus* taxa across multiple drainages of Mexico and Texas. That work identified six putative undescribed *Ictalurus* species across Mexico, none of which, however, were denoted as Chihuahua Catfish (Pérez-Rodríguez et al. 2022, pp. 15-20, 22, 32-35).

4.0 Species Description

The Chihuahua Catfish (*Ictalurus* sp. 1), a purported undescribed species of *Ictalurus*, is morphologically similar to or indistinguishable from the Headwater (*I. lupus*) Catfish with which it would hypothetically be sympatric in rivers and streams of northern Mexico and portions of New Mexico and Texas (Humphries and Miller 1998, pp. 1, 4, 8). Humphries and Miller (1998, entire) provide museum specimen numbers and localities of the holotype, paratopotype, and paratypes they assigned to the Chihuahua Catfish (Table 1).

Most collection localities (i.e., 10 of 16 sites) are represented by single individuals. Larger sample sizes (i.e., 6, 7, and 10) are reported from two rivers (i.e., Rio de Allende and Rio Florido) in southern Chihuahua, Mexico. A typed note (Humphries and Miller 1998, p. 6), presumably from Julian Humphries (i.e., first author) to Robert Miller (i.e., second author), suggest that additional data existed for other specimens and were yet to be assessed for inclusion as paratypes:

> "BOB, I know you have designated some additional types. I don't have counts or measurements on some of those and have not seen others. I think I probably want to examine any specimens we designate as paratypes."

How these other data would have impacted the species description is unknown. Collection localities and numbers of other measured catfish species, used for comparative purposes, are not provided in the document. Absence of that data limits an accurate interpretation of the degree to

which the authors considered geographical and morphological variation in their draft species description. In 2006, Hendrickson (2017, pp. 6-14) visited the University of Michigan to review Robert Miller's Chihuahua records and data at that institution, particularly the original data cited in the draft species description. A complete data set was not located (Hendrickson 2017, p. 6).

Table 1. Types assigned to the Chihuahua Catfish adapted from Humphries and Miller (1998, pp. 5-6).

Type	Museum Number	Date Collected	Number of Individuals	Location
Holotype	UMMZ 214590	May 23, 1978	1	Rio San Pedro, Satevó, Chihuahua
Paratopotype	UMMZ 203009	May 23, 1978	1	Rio San Pedro, Satevó, Chihuahua
Paratype	MSB 3180	NA	1	Pecos River, Eddy, Loving County, New Mexico
Paratype	UMMZ 66188	NA	1	Middle Berendo Creek, Roswell, Chavez County, Texas
Paratype	TNHC 4240	NA	2	Rio Grande, El Paso, El Paso County, Texas
Paratype	TNHC 2037	NA	1	San Felipe Creek, Del Rio, Val Verde County, Texas
Paratype	UMMZ 201537	NA	1	Rio Grande, Terrell County, Texas
Paratype	UANL 1892	NA	6	Rio Florido, Jiménez, Chihuahua, Mexico
Paratype	UANL 7121	NA	10	Rio Florido, Saucillo, Chihuahua, Mexico
Paratype	UMMZ 203240	NA	3	Rio de Allende, Allende, Chihuahua, Mexico
Paratype	UANL 2153	NA	7	Rio de Allende, Allende, Chihuahua, Mexico
Paratype	UMMZ 161739	NA	1	Rio Florido, Durango, Mexico
Paratype	ASU 64-0859	NA	1	Rio San Pedro, Meoqui, Chihuahua, Mexico
Paratype	UMMZ 196733	NA	1	Rio San Pedro, Meoqui, Chihuahua, Mexico
Paratype	UANL 5661	NA	2	Julimes, Chihuahua, Mexico
Paratype	FMNH 100478	NA	1	Linares, Nuevo Leon, Chihuahua

Table 2 in the unpublished draft provides means and ranges for measured morphological traits from individuals assigned to the Chihuahua Catfish as well as the Channel, Headwater, and Rio Verde (*I. mexicanus*) Catfishes (Table 2; Humphries and Miller 1998, p. 19). The authors do not provide morphological data for each individual catfish measured in the study.

The draft species description identifies morphological characters (e.g., number of anal rays and vertebrae, short pectoral and dorsal spines, a cylindrical body in cross-section, and skeletal features) the authors postulate define the Chihuahua Catfish as distinct from other ictalurid species (Humphries and Miller 1998, pp. 6-7). However, the authors state that (Humphries and Miller 1998, p. 4):

> "We have had difficulty in our analyses with specimens that are possible hybrids between *I. chihuahua* and *I. lupus* and between both these species and *I. punctatus* [Channel Catfish]. Based on conventional morphological or meristic evidence alone it is not always possible to be confident whether outlying counts or measurements are due to hybridization or simple variation. We have been cautious in including outliers in our description of *I. chihuahua*, and in comparisons with other species."

The researchers' multivariate analysis of body shape differences among the Chihuahua Catfish and other ictalurids failed to define shape differences for most assessed morphological characters (Humphries and Miller 1998, pp. 4, 8). The authors state (Humphries and Miller 1998, p. 8):

> "Although we performed a shape analysis (Bookstein, et al, 1985) to investigate body shape differences among these species, we quickly discovered that except for caudal peduncle depth and mouth width (plus spine lengths, which seem to show different patterns of variation than "typical" body shape characters), there is little shape difference recognizable in this multivariate analysis. The distinctive "rounder" or torpedo shaped body that is visible to the eye in *I. chihuahua* does not manifest itself in any of the multivariate shape analysis methods."

Humphries and Miller (1998, p. 8) completed simple linear regressions for the characters they viewed as most diagnostic (e.g., dorsal spine length and mouth width). According to the researchers:

> "In all plots, dorsal and pectoral spine lengths for chihuahua are shorter and grow at a slower pace than for lupus. The wider mouth and deeper caudal peduncle improve the scatter and allow positive identification when compared (via regression or ratios, Table 2) against the spine lengths."

However, as depicted in Table 2, values (i.e., means with standard deviation) for three of four morphological ratios overlap between Chihuahua and Headwater Catfishes. The only ratio to not overlap is pectoral spine length to deeper caudal peduncle. The researchers do not assess the potential for that difference to be attributable to intraspecific-variation and/or small sample size.

Table 2. Comparison of four species of *Ictalurus* from Gulf Slope Drainages. Proportions are mean = S.D. Adapted from Humphries and Miller (1998, p. 19) with bold text indicating overlapping values.

Character	***Chihuahua Catfish***	***Headwater Catfish***	***Rio Verde Catfish***	***Channel Catfish***
Anal rays (mean)	**22-26 (23.6)**	**23-27 (24.9)**	**20-24 (21.7)**	**26-32 (29.7)**
Typical values	**23-24**	**24-26**	21-22	28-30
Vertebrae range (mean)	**38-43 (40.0)**	**39-46 (40.8)**	**38-40 (39.1)**	**42-46 (43.9)**
Typical vertebrae values	**39-41**	**40-42**	**39**	43-45
Pectoral spine post. serration	few, non-recurved, short, blunt	many fine, recurved,	very few, blunt or tiny points	many large, recurved
Caudal forking	Shallow	Moderate	Very shallow	Deep
Extent of posterior cleithral process	Even with ascending process	Slightly past ascending process	Even with ascending process	Posterior to ascending process
P. spine/mouth width	**1.06 ± .14**	**1.33 ± .20**	**1.04 ± .11**	1.71 ± .24
P. spine/caud. ped. dep.	**1.05 ± .11**	1.30 ± .11	**1.10 ± .06**	1.76 ± .20
D. spine/mouth width	**1.05 ± .18**	**1.32 ± .25**	**1.18 ± .29**	1.77 ± .19
D. spine/caud. ped. dep.	**1.04 ± .13**	**1.29 ± .16**	**1.23 ± .21**	1.82 ± .18

Most quantitative values calculated by Humphries and Miller (1998, p. 19) overlap between the Chihuahua and Headwater Catfishes. Number of anal rays and vertebrae were quantitative traits cited by the authors as separating the Chihuahua Catfish from congeners. However, ranges of both traits for that species overlap with the Headwater Catfish. Those traits, and the remaining quantitative morphological traits cited in Table 2, appear to provide little to no discriminatory power among those taxa. Humphries and Miller (1998, p. 8) state that the Chihuahua Catfish is not easily separable from the Headwater Catfish. Remaining character traits are qualitative in nature (e.g., caudal forking and extent of posterior cleithral process). There is no discussion or consideration as to whether qualitative traits exhibited by individuals assigned to the Chihuahua Catfish may have been the result of intraspecific morphological variation.

5.0 Distribution

Humphries and Miller (1998, p. 1) describe the range of the Chihuahua Catfish as the Rio Conchos of Mexico, Pecos River of New Mexico and Texas, southward into the Rio San Fernando, an independent tributary to the Gulf of Mexico in Mexico (Figure 1). Surveys by Garrett (1997, pp. 2, 5-6) in the Rio Grande and Rio Conchos systems did not produce any specimens attributable to the Chihuahua Catfish. Garrett (1997, p. 6) noted that an individual catfish, collected from the Davis Mountains in western Texas in 1980, was later identified as the Chihuahua Catfish. Identity of that specimen was assigned by Robert Miller, second author of the unpublished description of the Chihuahua Catfish (Garrett 1997, p. 6; Edwards et al. 2002, p. 129). No information was provided detailing the morphological characters applied by that researcher to make that species-level determination (Garrett 1997, p. 6; Edwards et al. 2002, p. 129).

Humphries and Miller (1998, p. 6) state that the Chihuahua Catfish also occurs as an introduced species in the Gila River of southwestern New Mexico. This assertion is based on the authors' examination of some individuals from that river (Humphries and Miller 1998, 9). Again, no morphological characters are cited to provide the basis by which those identifications were made. The draft species description suggests that Chihuahua Catfish were introduced to the river system, potentially through stocking efforts in the early 20th century, from fish hatcheries in the state (Humphries and Miller 1998, p. 9). The presumption is that fish hatcheries held Chihuahua Catfish, but no evidence is provided by the authors to substantiate that claim. The authors only hypothesize that the Chihuahua Catfish, as well as Channel and Headwater Catfishes, were "available in the adjacent Pecos River" (Humphries and Miller 1998, p. 9).

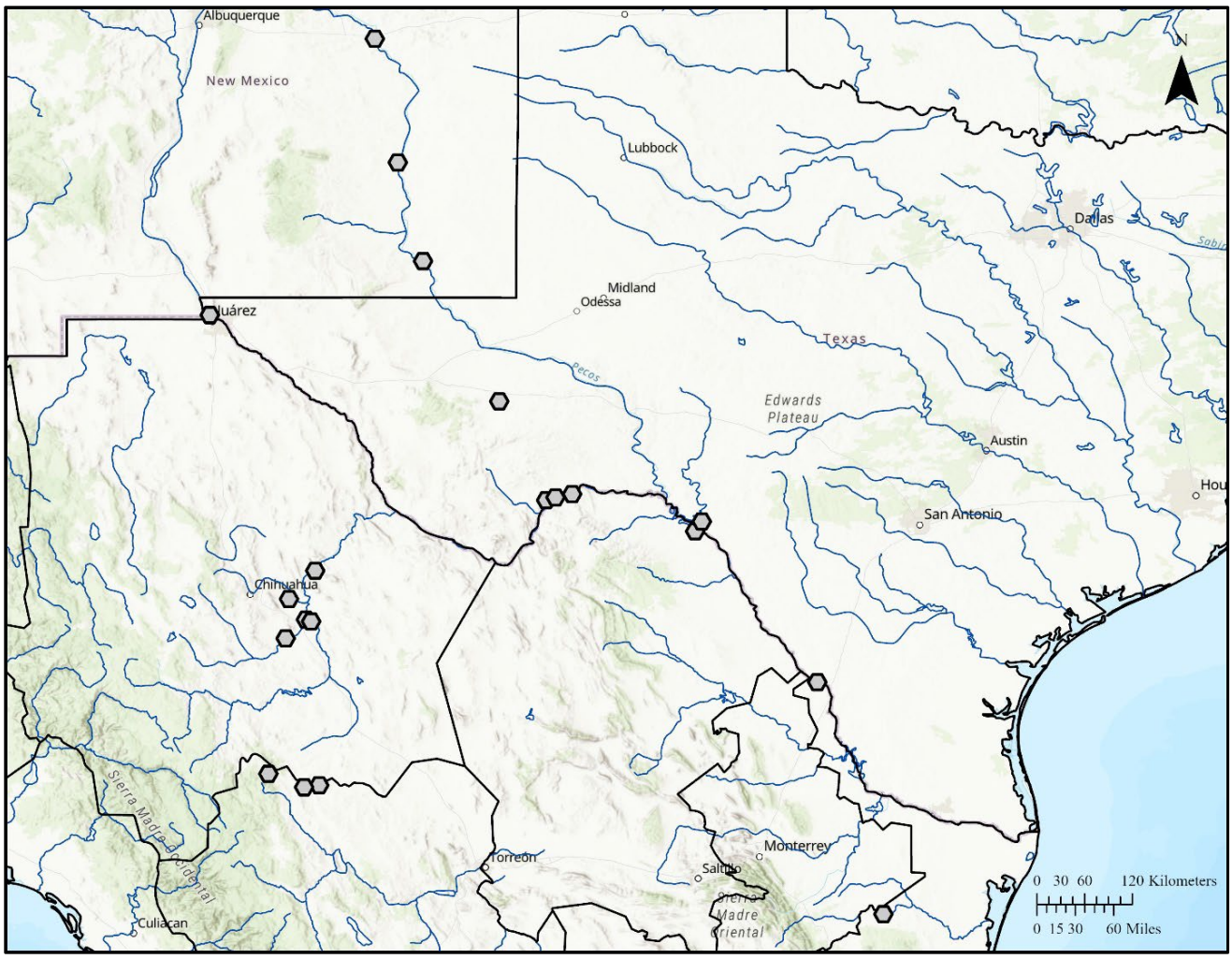

Figure 1. Localities of specimens assigned as Chihuahua Catfish in the draft species description. Adapted from Humphries and Miller (1998, p. 30). Localities for the Gila River are not mapped.

A 2005-2008 inventory of fishes of the East, Middle, and West Forks of the Gila River in southwestern New Mexico noted that "nonnative Chihuahua Catfish *Ictalurus* sp., an undescribed species, were commonly collected" (Paroz et al. 2009, p. 4). However, the report lists the Black Bullhead (*Ameiurus melas*), Flathead Catfish (*Pylodictis olivaris*), and Yellow Bullhead (*Ameiurus natalis*) as the only introduced ictalurids collected from the river system (Paroz et al. 2009, p. 12).

Another fish inventory of the Gila River references the presence of Chihuahua Catfish (Propst et al. 2009, p. 12), stating that "nonnative Chihuahua Catfish, an undescribed species, was commonly found at the upper site, but was less frequently collected at the lower site" of the East Fork Gila River (Propst et al. 2009, p. 12). A table of presence/absence occurrences of fish collections notes the Chihuahua Catfish from sampling periods in 1990 to 1995, 2000, 2004 to 2005, and 2007 (Propst et al. 2009, p. 12).

Correspondence with an author, David Propst, of both reports regarding the presence of Chihuahua Catfish indicates that identifications were made based on distinguishing morphological characters (i.e., caudal fin, pigmentation, and anal fin count) provided by Robert Miller in 1998 (Propst, Pers. Comm. 2022). Propst (2022) notes that the Channel, Chihuahua, and Headwater Catfishes are similar but can be distinguished by the Chihuahua Catfish's rounded caudal fin tips, shallow lobe cleft, darker coloration of young individuals (i.e., almost black in some specimens), and 22 anal rays along with "other meristic & phenotypic traits."

In the 1998 draft species description, Humphries and Miller (1998, p. 7) state they had "no observations of life colors" for Chihuahua Catfish. The authors only describe the coloration of chemically preserved (e.g., alcohol) museum specimens as laterally brownish in coloration with small to moderate spots (Humphries and Miller 1998, p. 7). Dorsal surface is described as slightly darker than the sides and fins lacking spots and pale in color (Humphries and Miller 1998, p. 7).

Chemical fixation and preservation techniques have been noted to alter morphology (e.g., coloration and appendage lengths) of preserved specimens of several taxa including amphibians, fishes, and reptiles (Klauber 1943, p. 18 20; Lazell 1972, pp. 11, 18-19, 63; Andriguetto and Haimovici 1988, pp. 214-215; Vervust et al. 2009, pp. 323-328; Vajargah and Hedayati 2014, pp. 106-108; Haubrock et al. 2018, pp. 82-83; Sotola et al. 2019, pp. 5-12). Coloration of chemically preserved fish has been shown to change (e.g., become opaque) following fixation (Vajargah and Hedayati 2015, pp. 519; Hossaini et al. 2016, pp. 119-120). Since Humphries and Miller (1998, p. 7) only assessed preserved specimens, use of that character to assign species identity live or recently dead fish is unlikely to be a reliable trait for identification.

Identification of Chihuahua Catfish from the Gila River were also determined on the presence of 22 anal rays (Propst, Pers. Comm. 2022). Humphries and Miller (1998, p. 6) state that the Chihuahua Catfish is separable from other catfishes by "22 to 26 (usually 23 or 24) anal rays." As noted in Table 2, the number of anal rays provided by those authors for the Headwater Catfish is 23-27 with a mean of mean 24.9. However, Yates et al. (1984, p. 97) notes an anal ray count range of 22-25 for the Headwater Catfish.

In a morphological assessment of the Channel and Headwater Catfishes across Mexico, New Mexico, and Texas, Kelsch (1995, pp. 275-276) found that specimens of the latter species ranged in anal ray count from 21 to 26. That author did suggest that three Headwater Catfish with anal ray counts of 21 might represent a different species (Kelsch 1995, p. 278). That taxonomic supposition has not been further investigated in peer-reviewed literature. Alternatively, variation in anal ray counts may also be reflective of hybridization among *Ictalurus* species (i.e., Channel and Headwater Catfishes) [Humphries and Miller 1998, p. 4; McClure-Baker et al. 2010, pp. 1,786-1,787]. Based on this information, anal ray count is unlikely to represent a reliable morphological character for defining Chihuahua Catfish.

Craig and Bonner (2019, pp. 35, 38) did not include the Chihuahua Catfish in Texas drainage basin checklists of inland fishes. A 2008 review of imperiled North American freshwater fishes did not include the Chihuahuan Catfish, though multiple other undescribed species and subspecies were included in that assessment (Jelks et al. 2008, pp. 388-407). Similarly, a 2003

review of described and undescribed freshwater fishes at risk of extinction in Mexico does not include the Chihuahua Catfish (Contreras-Balderas et al. 2003, p. 246-250).

Recent genetic analyses from Pérez-Rodríguez et al. (2022, pp. 15-20, 22, 32-35) identified multiple, well-differentiated *Ictalurus* populations across Mexico (Figure 2). Specifically, those researchers noted the existence of distinct population of the Headwater Catfish, three of which may represent new species (i.e., *I.* cf. *lupus* Conchos, *I.* cf. *lupus* Cuatro Cienegas, and *I.* cf. *lupus* Soto La Marina). Western localities of the putative Chihuahua catfish fall within the range of *I.* cf. *lupus* Conchos. Most remaining eastern localities nest within the range of the Headwater Catfish. No *Ictalurus* population defined by Pérez-Rodríguez et al. (2022, entire) was assigned to the Chihuahua catfish.

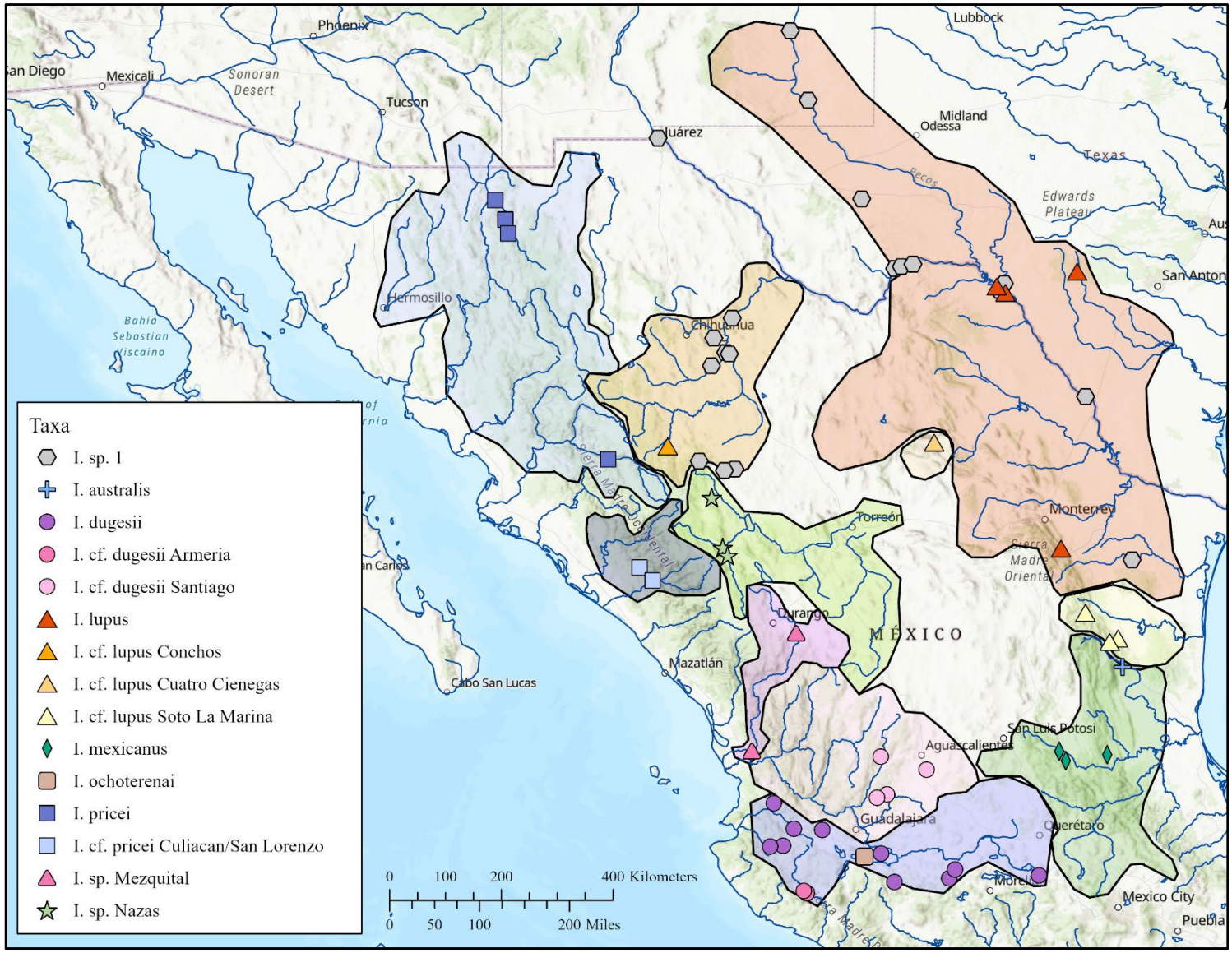

Figure 2. Distribution (i.e., colored polygons) and sample locations (i.e., symbols) for recognized, synonymized, and putative undescribed *Ictalurus* species adapted from Pérez-Rodríguez et al. (2022, p. 32). We include localities for the Chihuahua catfish (*I.* sp. 1) from Humphries and Miller (1998, p. 27) for comparative purposes.

6.0 State Wildlife Agency Status

In preparation for revision of the agency's State Wildlife Action Plan (i.e., Texas Conservation Action Plan), Texas Parks and Wildlife Department's Inland Fisheries Division contracted with the University of Texas at Austin to evaluate all fish species of greatest conservation need in their existing plan (Birdsong et al. 2020, pp. 5-6). This effort involved review of species distributions, trend analyses, and other assessments of species status resulting in the selection of 89 fish species of greatest conservation need (Birdsong et al. 2020, pp. 5-8). The Chihuahua Catfish was excluded from that group.

The Chihuahua Catfish was also not included in the agency's 2013 Texas Conservation Action Plan as a Species of Greatest Conservation Need (Texas Parks and Wildlife Department 2013). The rationale for not including the Chihuahua Catfish was as follows (Birdsong et al. 2020, pp. 6-7):

> "Chihuahua Catfish was excluded from the revised list of Texas SGCN based on the results of a genetic assessment conducted by TPWD (authors M. Bean and D. Lutz-Carrillo, unpublished data), which resolved available sequences within the Headwater Catfish *Ictalurus lupus* haplotype and genotype groups."

The Chihuahua Catfish has no conservation status in New Mexico and is not listed by the New Mexico Department of Game and Fish as a Species of Greatest Conservation Need in the agency's most recent State Wildlife Action Plan (New Mexico Department of Game and Fish 2019).

7.0 Conclusions

In assessing the best available scientific information for the status of a species, the Service generally relies on information published in peer-reviewed journals and other reports. Particularly related to taxonomic determinations, we defer to the scientific literature and to professional authorities for taxonomical assignments. However, when that information is in question, the Service conducts its own analysis and exercises our best scientific judgement.

For a taxon to be listed under the Act it must be a listable entity; that is, it must be either formally described and accepted as a species or subspecies or there must be credible scientific evidence that the entity should qualify as a valid species or subspecies. The Chihuahua Catfish has never been formally described in peer-reviewed literature as a valid taxonomic entity. A draft species description from 1998 proposed to describe the species as distinct but was never completed (Humphries and Miller 1998, entire; Hendrickson 2017, p. 3).

Recent morphological and genetic analyses found no evidence that the putative species exists in New Mexico and Texas (McClure-Baker et al. 2010, pp. 1,781-1,784; Parker et al. 2021, pp. 535-537, 539, 545; Bean et al. 2022; Pérez-Rodríguez et al. 2022, pp. 15-20, 22, 32-35). To date, no peer-reviewed publications have directly addressed the taxonomic status of the Chihuahua Catfish or provided evidence of its existence as a distinct species. We have reviewed all the available information regarding the taxonomic status of the putative Chihuahua Catfish and

conclude that there is insufficient credible scientific evidence that the entity qualifies as a valid species or subspecies.

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