Smallmouth Bass (*Micropterus dolomieu*)

Ecological Risk Screening Summary

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1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2019a):

"North America: St. Lawrence-Great Lakes system, Hudson Bay and Mississippi River basins from southern Quebec in Canada to North Dakota and south to northern Alabama and eastern Oklahoma in the USA."

"Native species ranging from Manitoba to Nova Scotia [Canada]; introduced into other provinces [Coker et al. 2001]."

Status in the United States

From Froese and Pauly (2019a):

"Widely transplanted throughout USA except in Atlantic and Gulf Slope drainages, where rare south of Virginia and east of central Texas [Page and Burr 1991]."

"Imported into Hawaii in 1953 for sportfishing; became established in Nu'uanu Reservoir No.3 in 1956; presently well established in the Ho'omaluhia Reservoir, Kaukonahua Stream, Nu'uanu Stream, and Maunawili Stream on O'ahu and in various streams on the island of Kaua'I; law

prohibits release of this species in areas where they had not previously occurred [Yamamoto and Tagawa 2000]."

According to Fuller et al. (2019), nonindigenous occurrences of *Micropterus dolomieu* have been reported in the following States, with range of years and hydrologic units in parentheses:

- Alabama (1971-2008; Black Warrior-Tombigbee, Cahaba, Coosa-Tallapoosa, Middle Coosa, Middle Tombigbee-Chickasaw, Mobile-Tombigbee, Sipsey Fork, Upper Tallapoosa)
- Arizona (1942-2012; Aqua Fria, Bill Williams, Havasu-Mohave Lakes, Imperial Reservoir, Lower Colorado Region, Lower Colorado-Marble Canyon, Lower Lake Powell, Lower Salt, Lower Verde, Middle Gila, Salt, Santa Maria, Silver, Tonto, Upper Gila-San Carlos Reservoir, Upper Salt, Upper Verde, Verde)
- Arkansas (1980-1988; Lower White)
- California (1874-2014; Butte Creek, California Region, Central California Coastal, Central Coastal, Clear Creek-Sacramento River, Honcut Headwaters-Lower Feather, Lake Tahoe, Los Angeles, Lower Colorado, Lower Sacramento, Mad-Redwood, Middle San Joaquin-Lower Chowchilla, Monterey Bay, North Fork American, Owens Lake, Pajaro, Russian, Sacramento Headwaters, Sacramento-Stone Corral, Salinas, Salton Sea, San Diego, San Francisco Bay, San Francisco Coastal South, San Joaquin, San Joaquin Delta, San Pablo Bay, San Pedro Channel Islands, Santa Ana, Santa Clara, Santa Margarita, Santa Maria, Santa Ynez, South Fork American, Suisun Bay, Truckee, Tulare-Buena Vista Lakes, Upper Cache, Upper Coon-Upper Auburn, Upper Kaweah, Upper King, Upper Merced, Upper Mokelumne, Upper Putah, Upper Sacramento, Upper San Joaquin, Upper Stanislaus, Upper Tule, Upper Yuba)
- Colorado (1951-2009; Big Thompson, Cache La Poudre, Clear, Colorado Headwaters, Colorado Headwaters-Plateau, Huerfano, Lower Gunnison, Lower Yampa, Middle South Platte-Cherry Creek, Middle South Platte-Sterling, North Fork Republican, Piedra, Republican, Rush, San Luis, South Platte, St. Vrain, Upper Arkansas, Upper Arkansas-John Martin Reservoir, Upper Dolores, Upper Green-Flaming Gorge Reservoir, Upper San Juan, Upper South Platte, Upper Yampa)
- Connecticut (1844-2007; Housatonic, Lower Connecticut, New England Region, Pawcatuck-Wood, Shetucket, Thames)
- Delaware (1888-1991; Brandywine-Christina, Delaware Bay, Upper Chesapeake)
- District of Columbia (1999-2010; Middle Potomac-Anacostia-Occoquan)
- Georgia (1970-2014; Apalachicola Basin, Broad, Coosawattee, Little, Middle Chattahoochee-Lake Harding, Savannah, Tugaloo, Upper Chattahoochee, Upper Coosa)
- Hawaii (1897-2005; Hawaii, Kauai, Oahu)
- Idaho (1905-2011; American Falls, Bear Lake, Big Wood, Blackfoot, Boise-Mores, Brownlee Reservoir, C.J. Strike Reservoir, Clearwater, Coeur d'Alene Lake, Hells Canyon, Idaho Falls, Lake Walcott, Little Wood, Lower Bear, Lower Boise, Lower Henrys, Lower North Fork Clearwater, Lower Salmon, Lower Snake-Asotin, Middle Fork Clearwater, Middle Salmon-Chamberlain, Middle Snake-Payette, Middle Snake-Succor, North Fork Payette, Payette, Pend Oreille Lake, Priest, Salmon Falls, South Fork Boise, South Fork Clearwater, Spokane, St. Joe, Upper Owyhee, Upper Snake-Rock, Upper Spokane, Weiser)
- Iowa (1987; Little Sioux)

- Kansas (1885-1995; Caney, Chikaskia, Elk, Lower Cottonwood, Lower Kansas, Lower Marais Des Cygnes, Medicine Lodge, Middle Neosho, Prairie Dog, Upper Marais Des Cygnes, Upper Neosho, Upper Smoky Hill)
- Kentucky (1986-1993; Upper Cumberland)
- Maine (1868-2015; Aroostook, East Branch Penobscot, Kennebec, Little River-Saint John River, Lower Androscoggin, Lower Kennebec, Lower Penobscot, Maine Coastal, Mattawamkeag, New England Region, Passamaquoddy Bay-Bay of Fundy, Piscataqua-Salmon Falls, Piscataquis, Presumpscot, Saco, St. Croix, St. George-Sheepscot, Upper Androscoggin, Upper Kennebec)
- Maryland (1854-2010; Cacapon-Town, Conococheague-Opequon, Gunpowder-Patapsco, Lower Susquehanna, Mid Atlantic Region, Middle Potomac-Catoctin, Monocacy, North Branch Potomac, Upper Chesapeake)
- Massachusetts (1860-2009; Blackstone, Cape Cod, Charles, Chicopee, Concord, Deerfield, Farmington, Housatonic, Merrimack, Merrimack River, Middle Connecticut, Miller, Narragansett, Nashua, New England Region, Quinebaug; Westfield)
- Minnesota (1900-2014; Big Fork, Buffalo, Clearwater, Eastern Wild Rice, Grand Marais-Red, Lake of the Woods, Little Fork, Lower Rainy, Mustinka, Otter Tail, Rainy, Rainy Headwaters, Red, Red Lake, Red Lakes, Rock, Sandhill-Wilson, Upper Red, Vermilion)
- Mississippi (1991; Upper Tombigbee)
- Missouri (1980-1998; Lamine, Lower Grand, Lower Missouri-Crooked, St. Francis, Tarkio-Wolf, Upper Grand)
- Montana (1914-2015; Battle, Beaver, Big Horn Lake, Blackfoot, Boxelder, Bullwhacker-Dog, Charlie-Little Muddy, Fisher, Fort Peck Reservoir, Frenchman, Judith, Little Bighorn, Lower Bighorn, Lower Clark Fork, Lower Flathead, Lower Milk, Lower Musselshell, Lower Tongue, Lower Yellowstone, Lower Yellowstone-Sunday, Marias, Middle Clark Fork, Middle Kootenai, Middle Milk, Middle Musselshell, O'Fallon, Peoples, Poplar, Prairie Elk-Wolf, Rosebud, Swan, Upper Milk, Upper Missouri, Upper Missouri-Dearborn, Upper Musselshell, Upper Tongue, Upper Yellowstone-Lake Basin, Upper Yellowstone-Pompeys Pillar, West Fork Poplar)
- Nebraska (1970-1999; Blackbird-Soldier, Cedar, Elkhorn, Frenchman, Harlan County Reservoir, Lewis and Clark Lake, Loup, Lower Elkhorn, Lower Middle Loup, Lower North Platte, Lower Platte-Shell, Lower South Platte, Medicine, Middle Niobrara, Middle North Platte-Scotts Bluff, Middle Platte, Middle Platte-Buffalo, Middle Platte-Prairie, Ponca, Red Willow, Snake, Stinking Water, Turkey, Upper Niobrara, Upper Republican, Upper White, Wood)
- Nevada (1888-2002; Central Lahontan, Lake Mead, Lower Humboldt, Middle Carson, Middle Humboldt, Ralston-Stone Cabin Valleys, Truckee, Upper Carson, Upper Humboldt)
- New Hampshire (1860-2001; Black-Ottauquechee, Contoocook, Merrimack River, Middle Connecticut, Miller, Nashua, New England, Pemigewasset, Piscataqua-Salmon Falls, Saco, Upper Androscoggin, Upper Connecticut, Upper Connecticut-Mascoma, Waits, West, Winnipesaukee River)
- New Jersey (1866-2014; Cohansey-Maurice, Crosswicks-Neshaminy, Hackensack-Passaic, Lower Delaware, Mid-Atlantic Region, Middle Delaware-Mongaup-Brodhead, Mullica-Toms, Raritan, Rondout)

- New Mexico (1957-2007; Rio Grande-Albuquerque, Rio Grande-Santa Fe, San Francisco, Upper Canadian, Upper Canadian-Ute Reservoir, Upper Gila-Mangas, Upper Pecos, Upper Rio Grande, Upper San Juan)
- New York (1872-2012; Ausable River, Chenango, Hudson-Hoosic, Hudson-Wappinger, Lower Hudson, Middle Delaware-Mongaup-Brodhead, Mohawk, Owego-Wappasening, Raquette, Rondout, Sacandaga, Saranac River, Schoharie, St. Regis, Upper Delaware, Upper Hudson, Upper Susquehanna)
- North Carolina (1941-2016; Lower Dan, Lower Yadkin, Neuse, Seneca, South Fork Catawba, South Yadkin, Upper Broad, Upper Catawba, Upper Dan, Upper Neuse, Upper New, Upper Pee Dee, Upper Yadkin)
- North Dakota (1980-1999; Bois De Sioux, Cedar, Elm-Marsh, James Headwaters, Knife, Lake Sakakawea, Lower Cannonball, Lower Heart, Lower Sheyenne, Middle Sheyenne, Moose Mountain Creek-Souris River, North Fork Grand, Painted Woods-Square Butte, Pipestem, Red, Souris, Turtle, Upper Cannonball, Upper Heart, Upper James, Western Wild Rice)
- Oklahoma (1973-1995; Caney, Kiamichi, Middle Verdigris, Red-Lake Texoma)
- Oregon (1905-2018; Applegate, Beaver-South Fork, Brownlee Reservoir, Bully, Burnt, Coast Fork Willamette, Goose Lake, Lower Columbia-Clatskanie, Lower Deschutes, Lower John Day, Lower Malheur, Lower Owyhee, Lower Rogue, Lower Snake, Lower Willamette, Middle Columbia-Hood, Middle Columbia-Lake Wallula, Middle Fork Willamette, Middle Owyhee, Middle Rogue, Middle Snake, Middle Willamette, Molalla-Pudding, North Fork John Day, North Santiam, Pacific Northwest, Powder, Siletz-Yaquina, Siltcoos, Silvies, South Santiam, South Umpqua, Tualatin, Umatilla, Umpqua, Upper Crooked, Upper Deschutes, Upper Grande Ronde, Upper John Day, Upper Malheur, Upper Rogue, Upper Willamette, Willamette, Willow)
- Pennsylvania (1983-1999; Bald Eagle, Cacapon-Town, Chemung, Conococheague-Opequon, Lehigh, Lower Juniata, Lower Susquehanna, Lower Susquehanna-Penns, Lower Susquehanna-Swatara, Lower West Branch Susquehanna, Middle Delaware-Mongaup-Brodhead, Middle Delaware-Musconetcong, Middle West Branch Susquehanna, Monocacy, North Branch Potomac, Owego-Wappasening, Pine, Raystown, Schuylkill, Sinnemahoning, Susquehanna, Tioga, Upper Juniata, Upper Susquehanna, Upper Susquehanna-Lackawanna, Upper Susquehanna-Tunkhannock, Upper West Branch Susquehanna)
- Rhode Island (1992-1994; Narragansett, New England Region)
- South Carolina (1975-2009; Cooper, Lower Broad, Middle Savannah, Saluda, Santee, Seneca, Stevens, Tugaloo, Upper Broad, Upper Savannah)
- South Dakota (1980-2001; Angostura Reservoir, Cheyenne, Fort Randall Reservoir, Grand, James, Lewis and Clark Lake, Lower Belle Fourche, Lower Big Sioux, Lower Cheyenne, Lower James, Lower Lake Oahe, Lower Moreau, Middle Cheyenne-Spring, Mud, South Fork Grand, Turtle, Upper James, Vermillion)
- Texas (1966-2017; Amistad Reservoir, Austin-Travis Lakes, Blackwater Draw, Brady, Buchanan-Lyndon B. Johnson Lakes, Denton, Double Mountain Fork Brazos, Elm Fork Trinity, Elm-Sycamore, Farmers-Mud, Jim Ned, Lake Meredith, Lake O'the Pines, Lake Texoma, Lampasas, Leon, Llano, Lower Brazos, Lower Devils, Lower Sulpher, Lower Sulphur, Lower West Fork Trinity, Medina, Middle Brazos-Lake Whitney, Middle Brazos-Palo Pinto, Middle Canadian, Middle Colorado, Middle Colorado-Elm, Middle

Guadalupe, Middle Sabine, Navasota, Palo Duro, Pecan Bayou, Reagan-Sanderson, San Ambrosia-Santa Isabel, San Gabriel, San Marcos, South Concho, Tule, Upper Colorado, Upper Guadalupe, Upper Salt Fork Red, Upper West Fork Trinity, White)

- Utah (1912-2006; Beaver Bottoms-Upper Beaver, Duchesne, Escalante Desert, Escalante Desert-Sevier Lake, Lower Green, Lower Green-Desolation Canyon, Lower Green-Diamond, Lower Lake Powell, Lower Weber, Provo, Strawberry, Upper Green-Flaming Gorge Reservoir, Upper Lake Powell, Upper Sevier, Upper Weber, Utah Lake)
- Vermont (1908-2011; Black-Ottauquechee, Deerfield, Hudson-Hoosic, Middle Connecticut, Missiquoi River, Passumpsic, St. Francois River, Upper Connecticut, Upper Connecticut-Mascoma, Waits, West, White, Winooski River)
- Virginia (1945-2014; Appomattox, Chowan, Conococheague-Opequon, James, Kanawha, Lower Dan, Lower James, Lower Potomac, Lower Rappahannock, Mattaponi, Maury, Meherrin, Middle James-Buffalo, Middle James-Willis, Middle New, Middle Potomac-Anacostia-Occoquan, Middle Potomac-Catoctin, Middle Roanoke, North Fork Shenandoah, Nottoway, Pamunkey, Potomac, Rapidan-Upper Rappahannock, Rivanna, Roanoke, Shenandoah, South Branch Potomac, South Fork Shenandoah, Upper Dan, Upper James, Upper New, Upper Roanoke, Upper Yadkin, York)
- Washington (1900-2010; Banks Lake, Colville, Duwamish, Franklin D. Roosevelt Lake, Hangman, Kettle, Lake Chelan, Lake Washington, Little Spokane, Lower Columbia-Clatskanie, Lower Cowlitz, Lower Crab, Lower Grande Ronde, Lower Snake, Lower Snake-Tucannon, Lower Spokane, Lower Yakima, Middle Columbia-Hood, Middle Columbia-Lake Wallula, Nooksack, Okanogan, Pacific Northwest Region, Palouse, Puget Sound, Puyallup, Rock, San Juan Islands, Similkameen, Snohomish, Strait of Georgia, Upper Chehalis, Upper Columbia-Entiat, Upper Columbia-Priest Rapids, Upper Crab, Upper Spokane, Upper Yakima, Walla Walla, Wenatchee)
- West Virginia (1984-2001; Cacapon-Town, Conococheague-Opequon, Middle New, Potomac, South Branch Potomac, Upper James)
- Wyoming (1889-2013; Big Horn, Great Divide Closed Basin, North Platte, Powder, Upper Green, Upper Green-Flaming Gorge Reservoir, Upper Laramie, Upper Tongue)

From Fuller et al. (2019):

"Established in most of the above states. Reported in Mississippi."

"Bass anglers account for a high influx of revenue in the Pacific Northwest, which helps supports the existing fisheries as well as conservation and management efforts in the region."

FAO (2019) lists *Micropterus dolomieu* as introduced but not established in Guam; introduced and established in Hawaii.

Means of Introductions in the United States

From Fuller et al. (2019)"

"Intentional stocking for sportfishing."

Remarks

From CABI (2019):

"It is possible for *M. dolomieu* to hybridise with at least four other basses including *M. salmoides* (largemouth bass), *M. coosae* (redeye bass), *M. punctulatus* (spotted bass) and *M. treculii* (Guadalupe bass) (Kerr and Grant 1999; Moyle 2002). Hybrids produced by *M. dolomieu* and *M. treculii* are fertile and can backcross with the parent species, more frequently with *M. dolomieu*. As a result, this can decrease the genetic diversity of the already depleted *M. treculii* further (USGS, 2016)."

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From Fricke et al. (2019):

"**Current status:** Valid as *Micropterus dolomieu* Lacepède 1802."

From ITIS (2019):

"Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Actinopterygii
Class Teleostei
Superorder Acanthopterygii
Order Perciformes
Suborder Percoidei
Family Centrarchidae
Genus *Micropterus*
Species *Micropterus dolomieu* Lacepède, 1802"

Size, Weight, and Age Range

From Froese and Pauly (2019a):

"Max length : 69.0 cm TL male/unsexed; [Page and Burr 1991]; common length : 8.0 cm TL male/unsexed; [Tomelleri and Eberle 1990]; max. published weight: 5.4 kg [International Game Fish Association 1991]; max. reported age: 26 years [Quinn 2001]"

From CABI (2019):

"*M. dolomieu* mature at age three or four and occasionally live to be 10-12 years old, with a maximum age of around 15 years being recorded in Canada (Scott and Crossman, 1973)."

Environment

From Froese and Pauly (2019a):

"Freshwater; benthopelagic. […]; 10°C - 30°C [water temperature] [Eaton et al. 1995]; […]"

"Adults inhabit shallow rocky areas of lakes, clear and gravel-bottom runs and flowing pools of rivers, cool flowing streams and reservoirs fed by such streams [Scott and Crossman 1998]."

From CABI (2019):

"The upper [water] temperature limit for adult *M. dolomieu* is 32°C, optimum range for adult rearing is 21-27°C, and the optimum range for spawning is 12.8-21°C (Edwards et al., 1983). Kane and Rabeni (1987) concluded that a pH of 5.1 adversely affects young *M. dolomieu*, but they can tolerate a pH from 5.7-9.0, with a preference of 7.9-8.1. *M. dolomieu* is able to withstand a turbidity of < 25 JTU (Brown et al., 2009). Optimal dissolved oxygen levels vary by life-stage, although normal activities require > 6 mgl-1, spawning requires > 7 mgl-1 and embryo/larvae development requires > 6.5 mgl-1 (Davis, 1975)."

Climate/Range

From Froese and Pauly (2019a):

"Temperate; […]; 47°N - 34°N"

Distribution Outside the United States

Native

Part of the native range for *Micropterus dolomieu* is in the United States. See Section 1 for a full description.

From Froese and Pauly (2019a):

"North America: St. Lawrence-Great Lakes system, Hudson Bay […] from southern Quebec in Canada […]."

"Native species ranging from Manitoba to Nova Scotia [Canada]; introduced into other provinces [Coker et al. 2001]."

Introduced

Froese and Pauly (2019a) list *Micropterus dolomieu* as introduced in Mauritius, South Africa, Tanzania, Japan, Vietnam, Austria, Belgium, Czech Republic, Slovakia, Belize, and Mexico. It is listed as introduced but not established in Denmark, Fiji, Finland, France, Germany, Netherlands, Norway, Swaziland, Sweden, United Kingdom, and Zimbabwe.

FAO (2019) lists *Micropterus dolomieu* as introduced and established in South Africa, Mexico, Belgium, and Japan; introduced and probably established in Sweden, Germany, and Belize;

introduced but probably not established in Zambia, Czech Republic, Austria, France, and Slovakia; introduced but not established in Zimbabwe, Swaziland, Denmark, Norway, United Kingdom, Fiji, Netherlands, and Finland.

From Froese and Pauly (2019a):

"Occurs in Mwanza Gulf, Lake Victoria [Tanzania] [Fermon 1997]."

"Introduced from North America to Lake Ashinoko [Japan] in 1925. Present range unclear. Has been recognized to be established in the country or found in the wild [Japan Ministry of Environment 2005]."

"[…]; introduced into other provinces [in Canada] [Coker et al. 2001]."

"Released in the streams in Nadarivatu [Fiji]. Species did not become established [Maciolek 1984]."

"Not useful and of only limited distribution [in Finland] [FAO 1997]. Questionable?"

"Rarely found in natural waters [in France]. The conditions of its introduction into France is not well known. Introduced into several regions but is not reported to have established itself in the wild [Keith et al. 1992; Billard 1997]."

"Seem to have disappeared after initial introductions [in Germany] [Gerstmeier and Romig 1998]. Has never been recorded from natural waters [Kottelat and Freyhof 2007]."

"Population [in Sweden] very limited in the area, not successful. Not established [NOBANIS 2013]."

From CABI (2019):

"There is a record of *M. dolomieu* in Belize (Froese and Pauly, 2004) however this record is believed to be invalid (Loppnow et al., 2013)."

Means of Introduction Outside the United States

From CABI (2019):

"Introductions of *M. dolomieu* outside of its native range began primarily through intentional stocking by managers of fisheries during the nineteenth century.

However, numerous pathways of introductions have been identified including intentional and unintentional introductions by anglers (Jackson, 2002) and unintentional introductions from bait bucket transfers (Litvak and Madrak, 1993). Drake (2011) suggests that bait bucket transfers in Ontario are responsible for as many as 20 introduction events of *M. dolomieu* per system per year into waterbodies outside of their current range. Records indicate that *M. dolomieu* was first introduced outside of its native range into Belgium in 1873 (FAO, 1997)."

Short Description

From Froese and Pauly (2019a):

"Dorsal spines (total): 9 - 11; Dorsal soft rays (total): 13-15; Anal spines: 10-11; Vertebrae: 31 – 32"

From CABI (2019):

"*M. dolomieu* are generally brown, occasionally black or green (seldom yellow) with red eyes, and dark brown vertical bands. The upper jaw does not extend past the eye and bronze streaks are common on their cheeks. Two dorsal fins with spinous and soft-rayed portions united, with 13–15 soft rays in the dorsal fin."

"*M. dolomieu* is often misidentified with the congener *M. salmoides* however, the two species can be easily told apart. The maxilla of *M. dolomieu* is roughly even with the pupil of the eye and the upper jaw reaches to near the rear margin of the eye, which is often red. In contrast, in *M. salmoides*, the upper and lower jaws extend past the back edge of the eye which is gold. *M. salmoides* also has a more pronounced notch between the spiny and soft parts of the dorsal fin, while this notch is more broadly connected in *M. dolomieu*. *M. dolomieu* has irregular dark brown dorsal vertical bars or shading, while *M. salmoides* has irregular bars forming a strip along the side and is often dark green on the dorsal surface."

From NatureServe (2019):

"The tail fin of young is three-banded with yellow, black, and white (at the tip); this fades with age."

Biology

From Froese and Pauly (2019a):

"Young feed on plankton and immature aquatic insects while adults take in crayfish, fishes, and aquatic and terrestrial insects [Etnier and Starnes 1993; Scott and Crossman 1998; Yamamoto and Tagawa 2000]. Are sometimes cannibalistic [Billard 1997]. Preyed upon by fishes and turtles [Scott and Crossman 1998]."

"The male builds the nest in shallow waters of lakes and rivers, on sand, gravel, or rocky bottoms. Nest building usually occurs within 150 yards of where his nest was built in previous years. The pair swims about the nest, rubbing and nipping each other and eventually come to rest on the bottom. Actual spawning occurs and lasts for 5 seconds. The pair then encircles the nest for about 25-45 seconds, before settling to spawn again. This goes on for 2 hours. After spawning, the female leaves the nest and may spawn with another male in another nest."

From CABI (2019):

"Spawning activity begins in the spring when water temperatures reach a minimum of 15°C. […] Females lay approximately 2,000 eggs at each spawning and a female can produce 2,000 to 21,000 eggs (Moyle, 2002). The norm is usually around 5,000 to 14,000 (Scott and Crossman, 1973). Several females may spawn in one nest (Whitlock, 2004). […] The male guards the eggs for 4-6 days and then the fry for approximately two weeks before they disperse (Scott and Crossman, 1973; Neves, 1975)."

"Populations of *M. dolomieu* have been described as seasonally migratory or non-migratory as many lake populations undergo short spawning migrations (Cuerrier, 1943). Langhurst and Schoenike (1990) observed *M. dolomieu* migrating 69-87 km when the autumn water temperature fell below 16°C."

"*M. dolomieu* are cannibalistic and mostly consumes fish, insects and crayfish (Scott and Crossman, 1973), with the bulk of their diets consisting of crayfish and aquatic insects (Lachner, 1950). Juvenile *M. dolomieu* however primarily eat plankton and insects."

From Whitlock (2004):

"Larvae are typically 2.2-2.5 mm long at hatching. The notochord flexion occurs at a length of 6-9 mm. Dorsal and anal fins are typically completely formed by the time the fish has reached 7-13 mm. Fins form in the following sequence: soft-rayed dorsal, anal, spinous dorsal, pelvic, pectoral. Rays first appear in the approximate middle of the area the complete ray will encompass, and expand proximally and distally until reaching full size. The caudal fin is typically complete by the time the dorsal and anal fins have their full complement of soft rays. First scales appear towards the end of the larval period, when the fish is approximately 14-18 mm in length (Johnson 1983)."

"Smallmouth bass, like other black basses, may congregate around structural elements such as fallen logs or other large debris (Etnier and Starnes, 1993)."

"Smallmouth bass may have a range that extends for a few hundred yards. This will typically contain several large structures they will use as cover, darting between them as they traverse their territory (Etnier and Starnes, 1993)."

"Smallmouth bass are highly visual predators; they require clear waters to be truly effective. Increasing turbidity decreases reactive distance significantly, ultimately reducing overall prey consumption. However, once a prey item has been reacted to, turbidity does not have an impact on capture success (Sweka and Hartman, 2003)."

Human Uses

From CABI (2019):

"*M. dolomieu* are one of the most popular sport fish in North America (Lasenby and Kerr, 2000). *M. dolomieu* is also one of the mainstays of the sport fishery and associated tourist industries in eastern Canada and Japan (Scott and Crossman, 1973)."

From Whitlock (2004):

"An important sport fish throughout its range, the smallmouth is almost as popular as the largemouth bass. It is also a popular food fish (Scott and Crossman 1973). In many states, taxes on the sales of fishing rods and tackle, as well as proceeds from the sale of licenses contribute a large part of the budget for natural resource management organizations."

"Each year, millions of dollars are spent by anglers in search of bass. Renowned for its fighting ability and tasty flesh, the smallmouth is fished for sport throughout its range (Etnier and Starnes, 1993)."

From NIES (2019):

"Import, transport and keeping are prohibited in Japan by the Invasive Alien Species Act."

Diseases

Infection with viral hemorrhagic septicemia virus is an OIE-reportable disease (OIE 2019).

According to Eckerlin (2008), *Micropterus dolomieu* can be infected with viral hemorrhagic septicemia virus.

Froese and Pauly (2019b) list *Micropterus dolomieu* as a host for *Achtheres micropteri*, *A. pimelodi*, *Ergasilus caeruleus*, *E. centrarchidarum*, *E. luciopercarum*, *Gyrodactylus micropteri*, *Lernaea cyprinacea*, *L. cruciata*, *Neoergaslius japonicus*, *Salmincola edwardsii*, *Sanguinicola huronis*, and *Tetracleidus banghami*.

From CABI (2019):

"Populations of *M. dolomieu* in Eastern Canada have been shown to host a number of bacterial, viral and parasitic diseases, including bass tapeworm *Proteocephalus* sp. and the grubs *Posthodiplostomum* sp., *Clinostomum* sp. and *Uvulifer* sp. (Hoffman, 1967). In North America, Becker et al. (1966) recorded a total of 21 different parasites from 489 bass from a reservoir in Arkansas."

Poelen et al. (2014) lists *Micropterus dolomieu* as a host for the following additional pathogens: *Acanthocephala* sp., *Acolpenteron ureteroecetes*, *Actinocleidus* sp., *Ancyrocephalus cruciatus*, *Apophallus brevis*, *A. venustus*, *Azygia* sp., *A. angusticauda*, *A. longa*, *Bolbogonotylus corkumi*, *Bothriocephalus* sp., *B. claviceps*, *Bucephalus* sp., *Caecincola parvulus*, *Camallanus lacustris*, *Centrovarium* sp., *C. lobotes*, *Cestoda* sp., *Chilodonella cyprini*, *Clavunculus* sp., *Cleidodiscus*

sp., *C. rarus*, *Clinostomum marginatum*, *C. complanatum*, *Contracaecum* sp., *Crepidostomum* sp., *C. cooperi*, *C. cornutum*, *Cryptogonimus* sp., *C. chyli*, *C. chili*, *Cucullanellus cotylophora*, *Cyathocotylidae* sp., *Dacnitoides cotylophora*, *Dichelyne bonacii*, *Digenea* sp., *Diplostomulum* sp., *D. scheuringi*, *D. spathaceum*, *Echinorhynchus* sp., *E. lateralis*, *E. salmonis*, *Ergasilus* sp., *Eustrongylides tubifex*, *Gyrodactylus* sp., *Haplocleidus dispar*, *Hysterothylacium* sp., *Leptocleidus megalonchus*, *Leptorhynchoides thecatus*, *L. nebularosis*, *Lernaeidae* sp., *Leuceruthrus micropteri*, *Ligula* sp., *Maritrema* sp., *Microphallus* sp., *Myxobolus branchiarum*, *M. inornatus*, *Myzobdella* sp., *Neascus* sp., *Nematoda* sp., *Neochasmus umbellus*, *Neoechinorhynchus* sp., *N. strigosum*, *N. cylindratus*, *N. rutili*, *N. prolixoides*, *N. tenellus*, *Onchocleidus* sp., *O. ferox*, *O. helicis*, *Philometra* sp., *Phyllodistomum* sp., *Pisciamphistoma stunkardi*, *Pomphorhynchus* sp., *Posthodiplostomum minimum*, *Prohemistomum chandleri*, *Proteocephalus* sp., *P. ambloplitis*, *P. microcephalus*, *Proterometra autraini*, *Pseudophyllidea* sp., *Quasimaritremopsis* sp., *Raphidascaris* sp., *R. brachyurus*, *R. acus*, *Rhipidocotyle papillosa*, *Rhynchotalona* sp., *Spinitectus* sp., *S. carolini*, *S. micracanthus*, *Syncleithrium fusiformis*, *Tetracleidus* sp., *Tetracotyle* sp., *Triaenophorus nodulosus*, *Urocleidus dispar*, *U. principalis*, and *Uvulifer ambloplitis*.

Threat to Humans

From Froese and Pauly (2019a):

"Potential pest"

3 Impacts of Introductions

From Shelton et al. (2014):

"Both [*Pseudobarbus*] *burchelli* and [*Sandelia*] *capensis* were generally abundant at sites above the waterfall [no *Micropterus dolomieu*] and not at sites below it [*M. dolomieu* present] […]. The density (mean ± S.E.) of *P. burchelli* in pools above the waterfall 152.10 ± 19.16 fish/100 m^2 was significantly higher than that in pools below it 0.53 ± 0.38 fish/100 m^2 (U8 = 0.01, P = 0.008). The density of *S. capensis* in pools above the waterfall was 22.12 ± 6.89 fish/100 m^2 but no *S. capensis* were recorded in pools below it. In riffles above the waterfall, the densities of *P. burchelli* and *S. capensis* were 57.33 ± 38.44 fish/100 m^2 and 10.33 ± 6.06 fish/100 m^2, respectively, but no fish were recorded in riffles below the waterfall. Statistical tests for *P. burchelli* in riffles, and *S. capensis* in pools and riffles, were not conducted since no fish were found below the waterfall in these biotopes. These results imply that *M. dolomieu* has had a strong, negative impact on the abundance of these native fishes in the Witte River [Cape Floristic Region, South Africa]."

"Our results corroborate those of Woodford *et al*. (2005) and Weyl *et al*. (2013), who found that while abundant above a waterfall barrier on the Rondegat River, five small-bodied native fish species, and juveniles of one large-bodied species were absent below it where *M. dolomieu* had established. A similar situation exists in the Blindekloof River where, while present at sites without *M. dolomieu*, three small-bodied native fish species were absent from a site where *M. dolomieu* was present (Ellender *et al.* 2011).

From CABI (2019):

"It is possible that *M. dolomieu* may become a dominant component of the food web, particularly in systems of low biological and physical complexity. It has been reported that the introduction of *M. dolomieu* often result in a shift in forage fish assemblages manifested as declines in abundance and reduced species diversity (DFO, 2009). There are numerous reports of this occuring [*sic*] in North America (Findlay et al., 2000; Weidel et al., 2000; MacRae and Jackson, 2001; Jackson and Mandrak, 2002) and other parts of the world (Impson, 1998; Iguchi et al., 2004). Indriect changes to planktonic and benthic communities have also been reported (Jackson, 2002)."

From Fuller et al. (2019):

"In Arizona, Smallmouth Bass reportedly are responsible for eliminating or reducing some populations of native fishes (Minckley 1973). Smallmouth Bass have been shown to eat smolts of Pacific salmonids, therefore posing a threat to these already declining species in the Columbia River (Dentler 1993). Similar trends have been observed in other major rivers of the Pacific Northwest, with Smallmouth Bass consuming up to 35 percent of outmigrating wild salmon. Kuehne and Olden (2012) found that juvenile Chinook Salmon *Oncorhynchus tshawytscha* showed fewer anti-predator flight and panic responses when exposed to Smallmouth Bass odors compared to odors from native Northern Pikeminnow *Ptychocheilus oregonensis*, indicating that salmonids may not recognize Smallmouth Bass as potential predators and prey naivety enhances success of novel predators. Smallmouth Bass experience a niche shift, switching food preference from insects and zooplankton to crayfish and fish, that causes competitive interactions with many other fish species (Carey et al. 2011). Jenkins and Burkhead (1994) speculated that introduced Smallmouth Bass may have contributed to the demise of an isolated population of Trout-perch *Percopsis omiscomaycus* in the Potomac River in Virginia and Maryland. Smallmouth Bass were introduced into Flaming Gorge Reservoir to reduce the Utah Chub *Gila atraria* (Teuscher and Luecke 1996). Introduced predatory centrarchids are likely responsible for the decline of native ranid frogs in California and for the decline of California tiger salamander *Ambystoma californien*se populations (Hayes and Jennings 1986; Dill and Cordone 1997). Nonnative predators, including Smallmouth Bass, have been shown to reduce the abundance and diversity of native prey species in several Pacific Northwest rivers (Hughes and Herlihy 2012). The presence of Smallmouth Bass, along with other introduced piscivores, reduced the richness of native minnow communities in Adirondack lakes (Findlay et al. 2000). Introduction of Smallmouth Bass may be driving isolation and population fragmentation in Umpqua Chub (*Oregonichthys kalawatseti*) in lower order streams in the Smith River drainage, Oregon (O'Malley et al. 2013).

Introduction of the Smallmouth Bass into the native range of Guadalupe Bass *M. treculii* in southcentral Texas has resulted in hybridization between the two species (Edwards 1979; Whitmore 1983). This hybrid bass is found in Canyon Lake and the San Marcos system, Guadalupe River drainage, on the Edwards Plateau in Texas (Whitmore 1983; International Game Fish Association 1994). It was first recognized by Edwards (1979) and later verified by Whitmore (1983). The hybrid is fertile and is capable of backcrossing to the parent species, with more backcrossing to Smallmouth Bass than to Guadalupe Bass (Whitmore 1983). Introgressive

hybridization represents another threat to the already depleted Guadalupe Bass by compromising its genetic integrity (Whitmore 1983). Although Lake Travis, on the Colorado River, also has been stocked with Smallmouth Bass, Whitmore (1983) found no evidence of hybridization there. Bean et al. (2013) used microsatellites to estimate introgression rates of Smallmouth Bass within Guadalupe Bass in the Brazos, Colorado, Guadalupe-San Antonio, and Nueces drainages; introgression was found within 4 subbasins, with rates highest in the Guadalupe subbasin. The Smallmouth Bass also hybridizes with the Spotted Bass *M. punctulatus* when stocked in the Spotted Bass's native range or when both species are stocked in the same area. The Smallmouth/Spotted Bass hybrid has been found in the Verde River, Arizona (Minckley 1973); California (Moyle 2002); the Marmaton River, Barbour County, Kansas (Cross 1967; museum specimen KU 4682); and southeastern Oklahoma (formerly described as *M. punctulatus wichitae*) (Cofer 1995). A third hybrid resulting from stocking Smallmouth Bass is the Smallmouth/Largemouth hybrid. Introduced Smallmouth Bass hybridize with native Largemouth Bass in Squaw Reservoir in northcentral Texas (Whitmore and Hellier 1988).

There are a few benefits despite the negative impacts of Smallmouth Bass. Bass anglers account for a high influx of revenue in the Pacific Northwest, which helps supports the existing fisheries as well as conservation and management efforts in the region. In addition, anglers enjoy increased bag and size limits for Smallmouth Bass. These regulations allow anglers to play a role in managing the native fish populations by decreasing non-native population size (Carey et al. 2011)."

4 Global Distribution

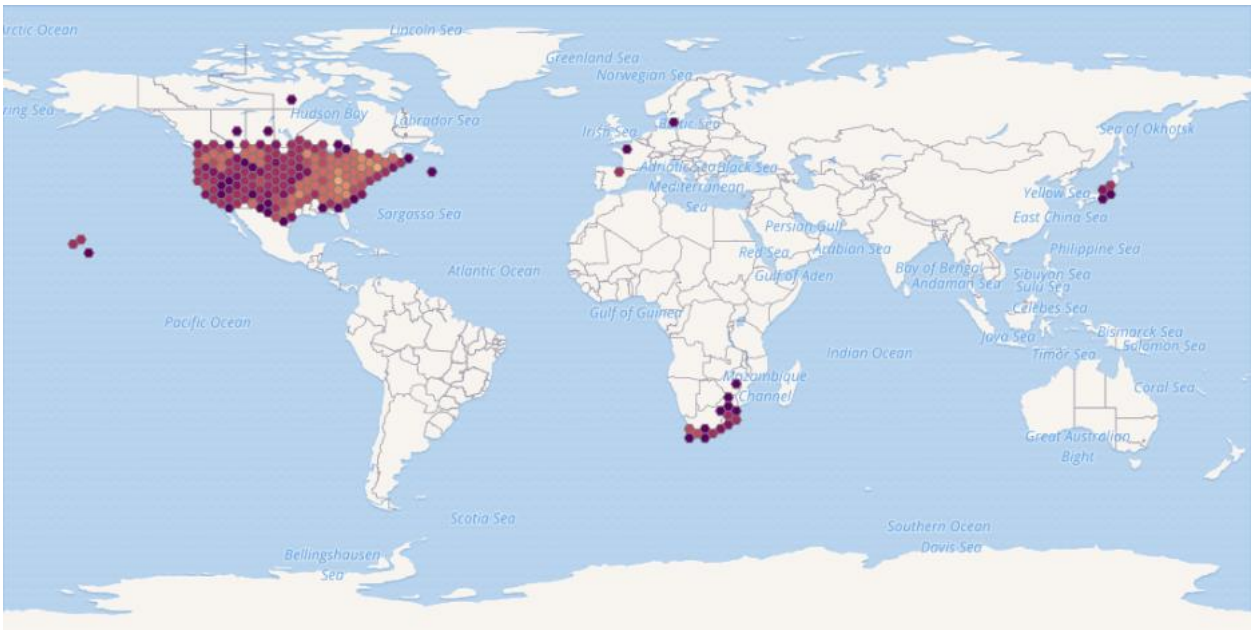

Figure 1. Known global distribution of *Micropterus dolomieu*. Map from GBIF Secretariat (2019). The northernmost location in Canada was not used to select source points for the climate match, the coordinates do not match the recorded collection location. The location off the east coast of Canada was not used to select source points for the climate match; it is a marine

location. The locations in France, Denmark, Spain, and Zimbabwe were not used to select source points for the climate match; *M. dolomieu* is not established in those locations.

5 Distribution Within the United States

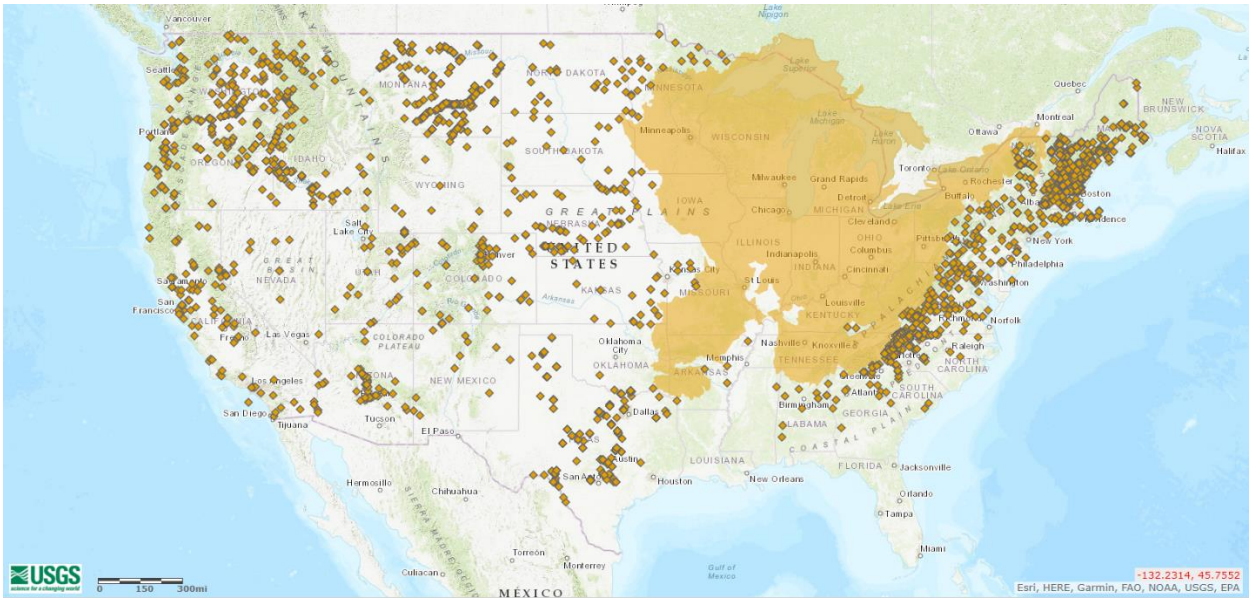

Figure 2. Known distribution of *Micropterus dolomieu* in the contiguous United States. The shaded yellow area indicates the native range of the species. Map from Fuller et al. (2019).

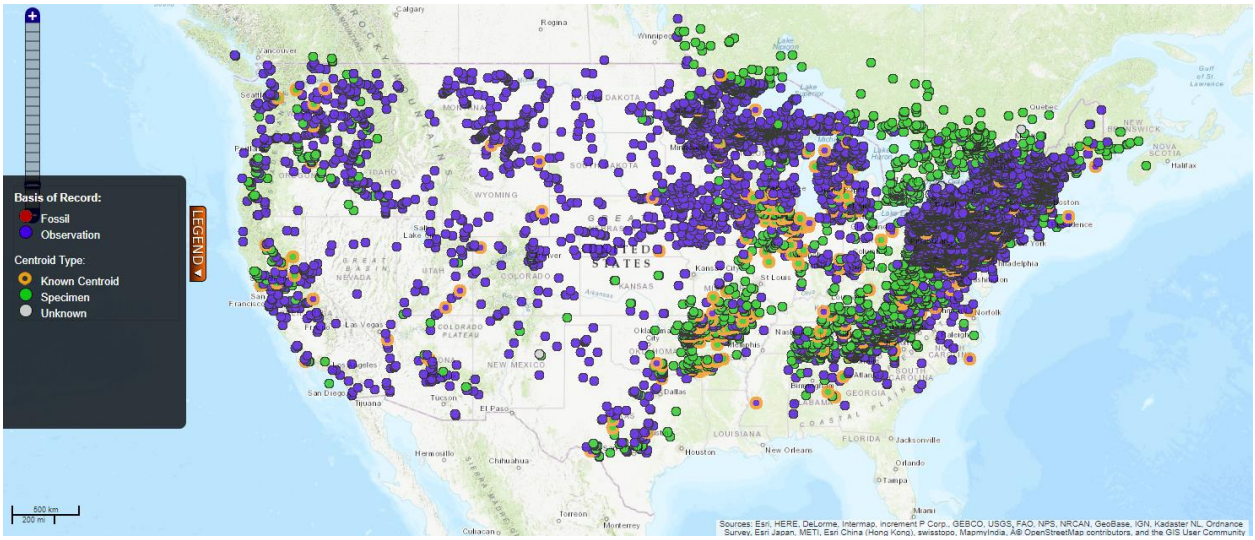

Figure 3. Additional known distribution of *Micropterus dolomieu* in the contiguous United States. Map from BISON (2019).

Figure 4. Known distribution of *Micropterus dolomieu* in the United States. Map from Fuller et al. (2019).

6 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Micropterus dolomieu* to the contiguous United States was generally high everywhere. There was a small area of medium match in the Pacific Northwest and the southern half of Florida had a medium match. The Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for contiguous United States was 0.991, high (scores 0.103 and greater are classified as high). All States had high individual Climate 6 scores.

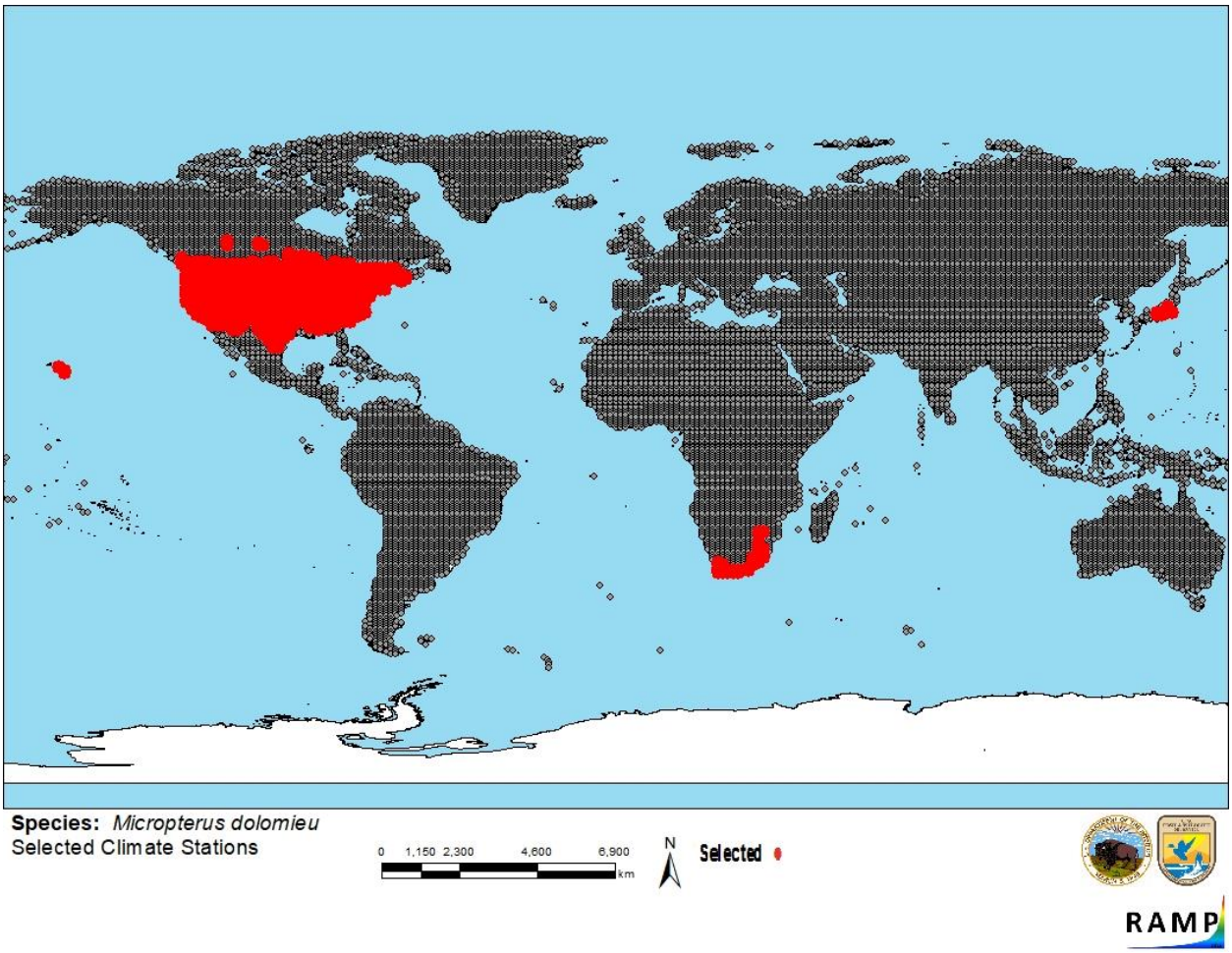

Figure 5. RAMP (Sanders et al. 2018) source map showing weather stations in North America, South Africa, and Japan selected as source locations (red) and non-source locations (gray) for *Micropterus dolomieu* climate matching. Source locations from BISON (2019), Fuller et al. (2019), and GBIF Secretariat (2019). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

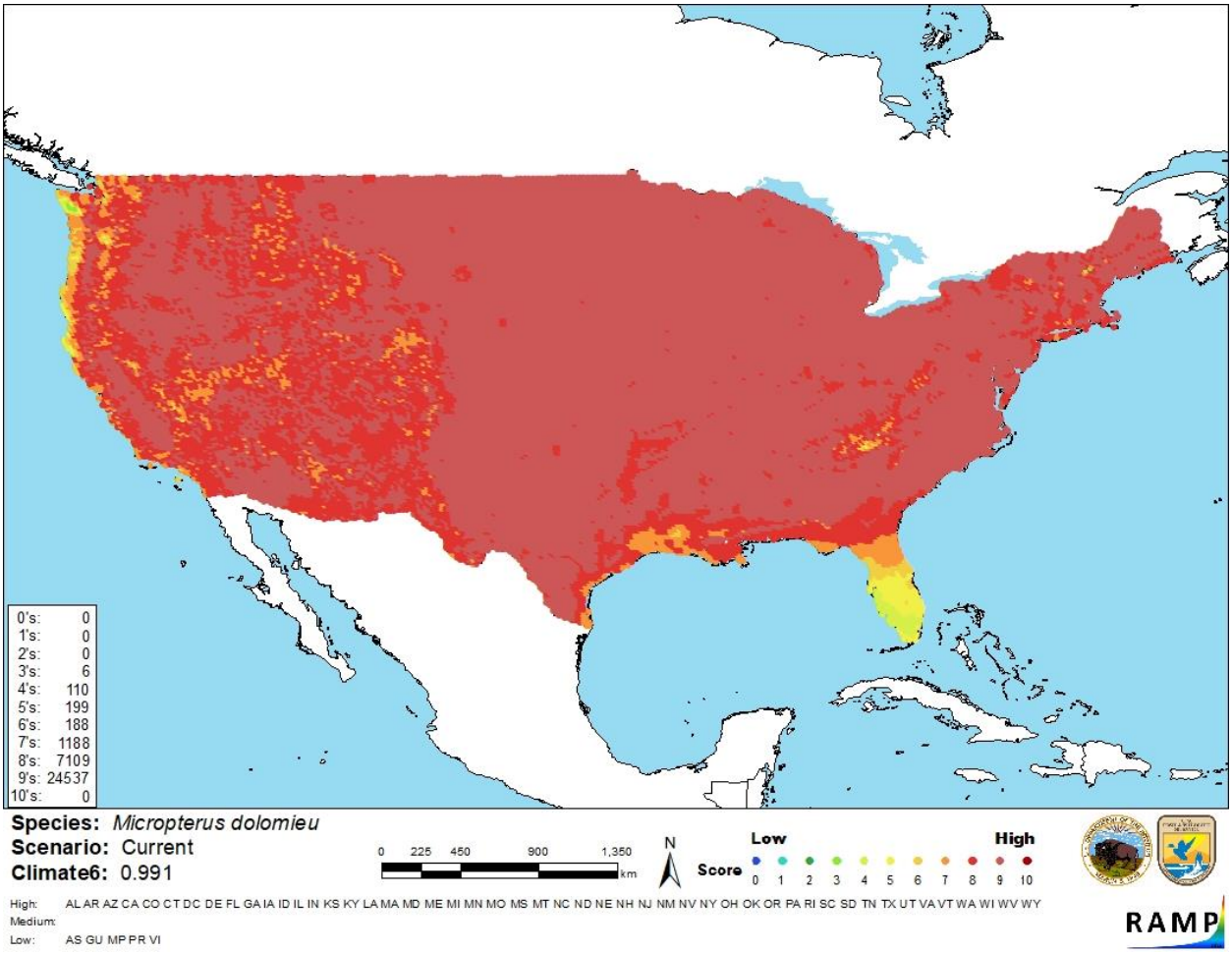

Figure 6. Map of RAMP (Sanders et al. 2018) climate matches for *Micropterus dolomieu* in the contiguous United States based on source locations reported by BISON (2019), Fuller et al. (2019), and GBIF Secretariat (2019). 0 = Lowest match, 10 = Highest match.

The High, Medium, and Low Climate match Categories are based on the following table:

Climate 6: Proportion of (Sum of Climate Scores 6-10) / (Sum of total Climate Scores)	Climate Match Category
0.000≤X≤0.005	Low
0.005<X<0.103	Medium
≥0.103	High

7 Certainty of Assessment

The certainty of assessment for *Micropterus dolomieu* is high. There is peer-reviewed information on the biology and ecology of the species. Numerous records of introduction and establishment were found. Impacts of introduction are well documented in peer-reviewed literature.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Smallmouth Bass (*Micropterus dolomieu*) is a fish native to the Great Lakes system and the Mississippi and Ohio River basins. *M. dolomieu* prefers cooler waters found in clear lakes, streams, and reservoirs. This predator spawns in the spring with males creating and guarding nests. It is one of the most popular and economically important sport fish in North America. The history of invasiveness is high. There is a long history of introductions in the western United States, southern Africa, Europe, and Japan, primarily to create a recreational fishery. Some of the introductions have resulted in established wild populations. The impacts of those introductions include hybridization with native *Micropterus* sp., changes in invertebrate communities, and native fish species population reductions and extirpations. *M. dolomieu* can be infected with, and potentially spread, viral hemorrhagic septicemia virus (VHS). The climate match is high. Virtually all of the contiguous United States had a high match. The certainty of assessment is high. The overall risk assessment category for *Micropterus dolomieu* is high.

Assessment Elements

- **History of Invasiveness (Sec. 3): High**
- **Climate Match (Sec. 6): High**
- **Certainty of Assessment (Sec. 7): High**
- **Remarks/Important additional information:** Can be infected with VHS.
- **Overall Risk Assessment Category: High**

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