PETITION TO LIST THE BAY SKIPPER *(Euphyes bayensis)* UNDER THE U.S. ENDANGERED SPECIES ACT

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Petition Submitted to the U.S. Secretary of Interior
Acting through the U.S. Fish and Wildlife Service

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December 29, 2009

WILDEARTH GUARDIANS
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Executive Summary

The Bay Skipper (*Euphyes bayensis*) is a species of butterfly dependent on tidal sawgrass marshes in limited areas in Texas, Mississippi, and perhaps nearby states. It was described by lepidopterist John Shuey in 1989. Since its discovery, the Bay Skipper has been reported from very few locations. One of those locations is its type locality and namesake: Bay St. Louis, Mississippi. The Bay St. Louis population was likely extirpated by Hurricane Katrina in 2005. A Texas location may have been eliminated by Hurricane Ike in 2008.

But this fragile butterfly may persist elsewhere in other sawgrass marshes along the Gulf Coast, undetected, and it deserves the best chance at survival through federal protection under the Endangered Species Act (ESA). As petitioners demonstrate, this butterfly is highly imperiled and likely meets all five criteria for ESA listing: habitat loss and degradation, overutilization, disease and predation, inadequate regulatory mechanisms, and other natural or manmade factors.

The foremost threat this species faces is from climate change effects on its coastal habitat. The Bay Skipper is on the frontline of extreme weather events, rising sea levels, and other dangers related to climate change. These perils also confront human communities on the Texas and Mississippi coasts, but while humans have the option to physically move away from vulnerable areas, the Bay Skipper likely does not. Being the product of a long evolutionary history, this butterfly likely depends on sawgrass or other marsh plants and might not be able to recolonize new areas if its current habitat is ravaged by weather or submerged.

In short, unless the climate crisis is met by political leaders in the U.S. and across the globe, this delicate jewel – to borrow Shuey's words – will be lost forever. One way to address this crisis is to fully enforce the ESA. We therefore request timely listing of the Bay Skipper under the ESA and designation of its critical habitat.

Introduction

The Bay Skipper (*Euphyes bayensis*) is one of at least five species of butterflies restricted to the southern Atlantic and Gulf Coastal Plain. The other butterflies similarly restricted are *Euphyes palatka palatka, E.p. klotsi, E. berryi*, and *E. dukesi calhouni* (Shuey 1996).[1] With the discovery of *E. dukesi calhouni*, Shuey (1996: 52) wrote:

> …the recognition of *Euphyes dukesi calhouni* reveals yet another jewel in the collection of unique and highly endemic flora and fauna of Florida. This recognition increases the number of southern coastal plain restricted wetland Euphyes taxa to five, and adds another piece to the puzzle of wetland butterfly distribution and evolution in eastern North America.

The Bay Skipper is similarly a jewel and a vibrant part of the ecology of coastal Texas, Mississippi, and perhaps neighboring states. However, as petitioners demonstrate, the Bay Skipper has very few known populations and an extremely small range. Within that small range, it has been battered by extreme weather events such as Hurricanes Katrina and Ike, which, as discussed below, are likely to increase unless the global climate crisis is effectively addressed. The Bay Skipper faces other threats, including pesticide spraying and possibly overcollection. It currently lacks sufficient legal or regulatory protections to confront these dangers to its persistence.

Petitioners WildEarth Guardians and the Xerces Society for Invertebrate Conservation seek listing of the Bay Skipper under the Endangered Species Act (ESA) in order to give this rare, fragile creature its best chance of survival. Over 99% of the species listed under the ESA still exist.[2] The ESA is the Bay Skipper's best hedge against extinction.

Endangered Species Act Implementing Regulations

Section 424 of the regulations implementing the Endangered Species Act (50 C.F.R. § 424) is applicable to this petition. Subsections that concern the formal listing of the Bay Skipper as an Endangered or Threatened species are:

> 424.02(e) "*Endangered species* means a species that is in danger of extinction throughout all or a significant portion of its range."…(k) "species" includes any species or subspecies that interbreeds when mature. *See also* 16 U.S.C § 1532(6).
>
> (m) "*Threatened species* means any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." *See also* 16 U.S.C § 1532(20).

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[1]Shuey, J.A. 1996. Another new *Euphyes* from the southern United States coastal plain. Journal of the Lepidopterists' Society 50(1): 46-53. [Attachment 1].

[2]Compare the number of species currently listed under the ESA (1321) with the species that have been delisted due to extinction (9). *See* **http://www.fws.gov/endangered/wildlife.html** [Accessed November 2009].

ESA Section 4 (16 U.S.C. § 1533(a)(1)) sets forth listing factors under which a species can qualify for ESA protection (see also 50 C.F.R. § 424.11(c)):

A. The present or threatened destruction, modification, or curtailment of habitat or range;
B. Overutilization for commercial, recreational, scientific, or educational purposes;
C. Disease or predation;
D. The inadequacy of existing regulatory mechanisms; and
E. Other natural or manmade factors affecting its continued existence.

All listing factors set forth in 50 C.F.R. § 424.11(c) and in ESA Section 4 (16 U.S.C. § 1533(a)(1)) have resulted in the continued decline of the Bay Skipper and are causing the species to face extinction or endangerment in the foreseeable future. A taxon needs to meet only one of the listing factors outlined in the ESA to qualify for federal listing.

Classification and Nomenclature

Common Name. *Euphyes bayensis* is known by the common names "bay skipper" and "Bay St. Louis skipper." Throughout the petition, we refer to this species as the Bay Skipper and the Skipper.

Taxonomy. The petitioned species is *Euphyes bayensis* Shuey, 1989.[3] Its type locality (and the origin of its common name) is Bay St. Louis, Hancock County, Mississippi. Shuey (1993)[4] reported on the phylogeny within the *Euphyes* genus, finding that *E. bayensis* is a species in the dion complex. Most scientists currently consider the taxon as valid (Pelham 2008[5]; NatureServe 2009[6]). The taxonomic classification for *Euphyes bayensis* is shown in Table 1.

[3]Shuey, J.A. 1989. The morpho-species concept of *Euphyes dion* with the description of a new species (Hesperiidae). Journal of Research on the Lepidoptera 27(3-4):160-172. [Attachment 2]
[4]Shuey, J.A. 1993. Phylogeny and biogeography of *Euphyes* Scudder (Hesperiidae). Journal of the Lepidopterists' Society 47(4): 261-278. [Attachment 3]
[5]Pelham, J.P. 2008. A Catalogue of the Butterflies of the United States and Canada. The Journal of Research on the Lepidoptera. Volume 40, 658 pages. Pp. 93-94. [Attachment 4]
[6]NatureServe. 2009. Species Account for *Euphyes bayensis* (Bay skipper). Downloaded from **www.natureserve.org/explorer** on November 8, 2009. [Attachment 5]

Table 1. Taxonomy of *Euphyes bayensis*.

Phylum	Mandibulata
Class	Insecta (insect)
Order	Lepidoptera (butterflies and moths)
Superfamily	Hesperioidea
Family	Hesperiidae (skippers)
Subfamily	Hesperiinae (grass skippers)
Genus	*Euphyes*
Species	*bayensis*

The *Euphyes* genus is relatively small, consisting of a total of 20 species with 3 centers of endemism: eastern North America, central South America, and the northern Antilles (Shuey 1993). Species within this genus – including the Bay Skipper – may have evolved due to isolation of peripheral populations that differentiated over time. A factor in the Bay Skipper's evolution may have been glacial cycling, which rearranges wetland habitat by expanding and contracting coastal and inland wetlands. *Id*.

Description

The Bay Skipper has a 1.5-1.75 in (3.7-4.4 cm) wingspan. On their dorsal side, males are black with a large orange patch on each wing, and a prominent black stigma on the forewing. The females are dark brown with yellow spots on their forewing and a yellow streak on their hindwing. The ventral sides of both are a shade of brown that is paler than the dorsal side of the female and have pale yellow spots on the forewing, with two yellow streaks from the base to the margin (Vaughan and Shepherd 2005[7]; BMNA 2009[8]).

Distinctive traits

The Bay Skipper's closest relatives are the Dion Skipper (*E. dion*) and Dukes' Skipper (*E. dukesi*) (Shuey 1993). While similar in appearance to the Dion Skipper, the dorsal side of the Bay Skipper is a brighter shade of orange and the black borders are more narrow. Dukes' Skippers have a sooty black dorsal side and are found in different habitat. Shuey (1989) discusses in detail the characteristics that make the Bay Skipper a distinct species. See also Figures 1 & 2.

[7]Vaughan, D. M., and M. D. Shepherd. 2005. Species Profile: *Euphyes bayensis*. In Shepherd, M. D., D. M. Vaughan, and S. H. Black (Eds). *Red List of Pollinator Insects of North America*. CD-ROM Version 1 (May 2005). Portland, OR: The Xerces Society for Invertebrate Conservation. Online at: **http://www.xerces.org/wp-content/uploads/2008/09/euphyes_bayensis.pdf** [Attachment 6]

[8]See species account for Bay Skipper (*Euphyes bayensis*) at **www.butterfliesandmoths.org** (Butterflies and Moths of North America)[Accessed December 2009]. [Attachment 7]

Figure 1. Comparison of dorsal wing pattern in the Bay Skipper (Columns 1 & 2) and the Dion Skipper (Columns 3 & 4). Source: Shuey (1989).

Figure 2. Comparison of ventral wing pattern in the Bay Skipper (Columns 1 & 2) and the Dion Skipper (Columns 3 & 4). Source: Shuey (1989).

Range distinction

While the range of the Bay Skipper overlaps with and is at the extreme southern edge of the broader-ranging Dion Skipper, they occupy different habitats in Mississippi and do not occur in the same areas within Texas.[9] The Bay Skipper has been found in association with brackish marshes, but the Dion Skipper normally uses freshwater wetlands (Shuey 1989). The Bay Skipper's range also overlaps with Dukes' Skipper, which occurs in different habitats: shaded tupelo swamps and shaded marshes and ditches.[10]

Geographic Distribution: Historic and Current

The Bay Skipper is known from Chambers and Jefferson counties in Texas and Hancock County in Mississippi. It may also occur in Louisiana and Alabama, as its tidal sawgrass habitat is abundant on the coast of those two states, and perhaps neighboring states. See Figures 3-5.

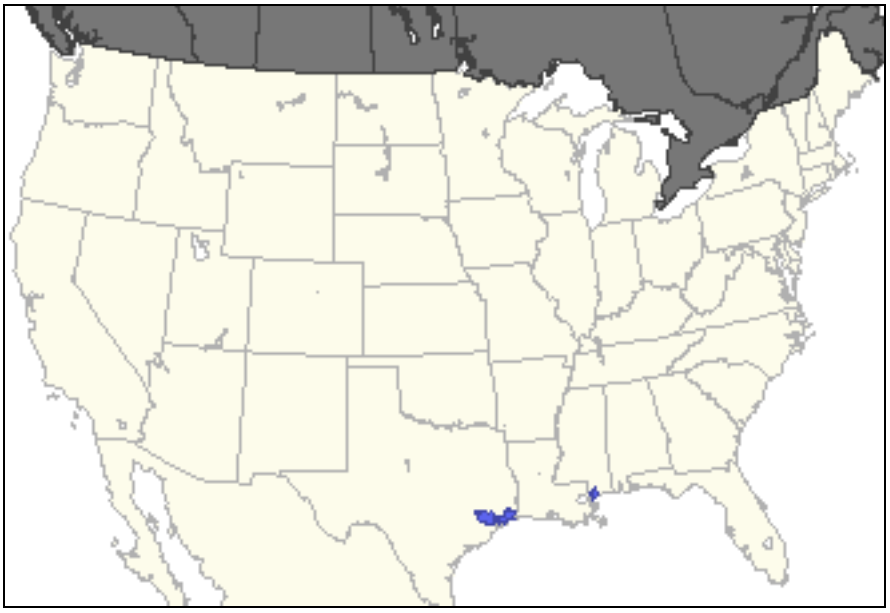

Figure 3: Global Range of the Bay Skipper.
Source: Butterflies & Moths of North America 2009.

[9]Petitioner compared state range maps of the Dion and Bay Skippers available at Butterflies & Moths of North America: **www.butterfliesandmoths.org** [Accessed November 2009]. *See also* Shuey (1996).
[10]See **http://www.butterfliesandmoths.org/species?l=2129&chosen_state=48*Texas** [Accessed November 2009].

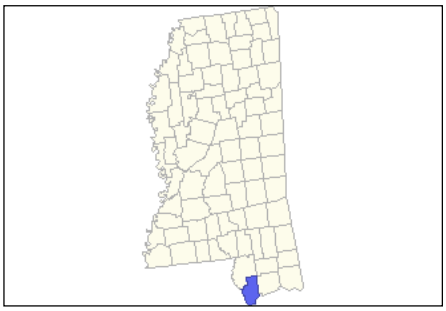

Figure 4: Mississippi Range of the Bay Skipper. Highlighted county denotes its range. Source: Butterflies & Moths of North America 2009.

Figure 5: Texas Range of the Bay Skipper. Highlighted county denotes its range. Source: Butterflies & Moths of North America 2009.

Habitat Requirements

The Bay Skipper has been found in association with brackish sawgrass marshes in coastal areas (NatureServe 2009; BMNA 2009). More research is needed to determine the larval host plant of this species and other habitat requirements. The Bay Skipper may utilize sawgrass (NatureServe 2009) as a larval host plant, as sawgrass dominates the habitat where the Bay Skipper has been found. It likely does not utilize *Carex hyalinolepus*, which is the larval host plant of the closely related Dion Skipper, as Charles Bryson was unable to find that plant in surveys of habitat associated with the Bay Skipper.[11]

Life History

Research is needed to better understand the life history of the Bay Skipper. However, it may be similar to the Dion Skipper, except that the Dion Skipper utilizes freshwater wetlands and the Bay Skipper uses brackish marshes (BMNA 2009). Scientists describe the Dion Skipper's habits as follows:

> **Life history:** Males have a very quick flight, are territorial, and perch in marshes in the afternoons to await females; sometimes they patrol in the late morning. Third-stage caterpillars hibernate, emerge in the spring to complete feeding, and pupate in nests of leaves and silk.
> **Flight:** One brood in the north from July-early August; two broods in the south from May-September.
> **Caterpillar hosts:** Various sedges including woolgrass (*Scirpus cyperinus*), hairy sedge (*Carex lacustris*), and shoreline sedge (*Carex hyalinolepis*).
> **Adult food:** Nectar from flowers of pickerelweed, sneezeweed, buttonbush, Alsike clover, and others. *Id*.

[11]Reported in Shuey (1989).

Shuey (1989) noted that *Carex hyalinolepis* could not be found at the Bay Skipper's type locality. Rather, the Bay Skipper's habitat there was dominated by sawgrass.

Reproduction and Dispersal

There are two flight periods: in late May and September. The gap between the flight periods suggests that the larvae may aestivate in the interim, and the larvae also hibernate during the winter. Aestivating and hibernating larvae are probably in the third or fourth instar. The larval foodplant is likely sawgrass (*Cladium* sp.) (NatureServe 2009).

Historic and Current Population Status & Trends

Historic and Current Range

Petitioners are aware of Bay Skipper reports from only 2 locations. It may be found in other locations within its sawgrass marsh habitat in Mississippi, Texas, Alabama, Louisiana and perhaps other states, but the lack of records suggests it has a very limited range and is very rare (Vaughan & Shepherd 2005; NatureServe 2009) (Table 2).

Table 2. Bay Skipper Locations.

General location	Status	Sources
Bay St. Louis, Hancock Co., MS	Likely extirpated due to Hurricane Katrina in 2005	NatureServe (2009)
Anahuac NWR, TX	Inundated during Hurricane Rita, but not hit with major storm surge; possibly extirpated by Hurricane Ike in 2008	NatureServe (2009); pers. comm., David Sarkozi (2009)

The Bay St. Louis locality may have been eliminated by Hurricane Katrina, and no Bay Skippers have been found at the Anahuac Refuge since Hurricane Ike (NatureServe 2009, David Sarkozi, pers. comm., 2009). Its current range is therefore unknown.

Identified Threats to the Petitioned Species: Criteria for Listing

The Bay Skipper likely meets all of the criteria for listing under the ESA:

A. Present and threatened destruction, modification, and curtailment of habitat and range;
B. Overutilization for commercial and recreational purposes;
C. Disease or predation;
D. The inadequacy of existing regulatory mechanisms; and
E. Other natural or manmade factors affecting its continued existence.

The coastal marsh habitat used by this species is vulnerable to natural disasters, which are likely exacerbated by climate change (Factors A and E). Its coastal wetlands may be degraded by human activities (Factor A) and may also be subjected to pesticide spraying to control mosquitoes (Factor E). This species is rare and has a limited range and is therefore vulnerable to extirpation from stochastic events (Factor E). Due to its rarity, it is likely prized for collection and therefore may suffer from overutilization (Factor B). Its small population size also makes it vulnerable to disease and predation (Factor C). Finally, there are inadequate regulatory mechanisms to address all of these threats (Factor D).

I. Present and Threatened Destruction, Modification, or Curtailment of Habitat or Range.

Extreme weather events and sea level rise threaten the habitat of the Bay Skipper, as discussed below. In addition, much of the Bay Skipper's habitat in Mississippi is developed. While its Texas habitat includes the Anahuac National Wildlife Refuge, the refuge's plan fails to include specific protections for the Bay Skipper's habitat and allows many activities that could harm the Skipper, as discussed below (FWS 2008).

II. Overutilization for commercial, recreational, scientific, or educational purposes

NatureServe (2009) indicates that collecting has apparently not been a threat to the species to date, but Vaughan and Shepherd (2005) list collecting as a threat. NatureServe further indicates that specimens would be needed to document new occurrences but that they should be restrictively collected. FWS should investigate whether collecting is a threat in the course of a full status review for this species.

Insect collecting is a valuable component of research, including systematic work, and is often necessary for documenting the existence of populations and population trends. Collecting is also a potential threat to rare species. Butterfly populations that are small and easily accessible are especially vulnerable to over-collection.

III. Disease or Predation

Many, if not most, insect populations normally experience large fluctuations in size.[12] Predation and disease may cause annual changes in butterfly numbers of an order of magnitude or more. The likely small size of Bay Skipper populations increases their vulnerability to extirpation due to natural fluctuations that may occur as a result of disease or predation pressures. Adult and larval butterflies are subject to predation by a wide variety of vertebrate and invertebrate wildlife (e.g., birds, reptile, amphibians, other insects).

[12]Ehrlich, P.R. 1992. Population biology of checkerspot butterflies and the preservation of global biodiversity. Oikos. 63:6-12 and Schultz, C.B. 1998. Ecology and Conservation of the Fender's Blue Butterfly. PhD. Dissertation, University of Washington. Seattle, WA. 145pp. [Attachment 8]

IV. The inadequacy of existing regulatory mechanisms

The Bay Skipper is not adequately protected by federal or state laws or policies to prevent its endangerment or extinction.

NatureServe Global Status: NatureServe ranks this species as G1G3, rounded to G2. These ranks are defined as follows:

> **G1 Critically Imperiled**: At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.[13]
>
> **G2 Imperiled**: At high risk of extinction or elimination due to very restricted range, very few populations, steep declines, or other factors.[14]
>
> **G3 Vulnerable**—At moderate risk of extinction or elimination due to a restricted range, relatively few populations, recent and widespread declines, or other factors.[15]

NatureServe National Status: The Bay Skipper has a national ranking of N1N3, which is equivalent to its global rank given that this species is only known from the U.S.

While indicating biological imperilment, these rankings do not provide any regulatory or policy mechanisms to protect the Bay Skipper.

USFWS: the Bay Skipper was a former Category-2 candidate for ESA protection. FWS dropped it as a candidate when it eliminated the Category-2 list in 1996. 59 FR 58982, 61 FR 7595-7613. The Bay Skipper currently has no status under the ESA: it is not listed, proposed, or a candidate for listing.

The Bay Skipper occurs on the Anahuac National Wildlife Refuge, and FWS therefore has the ability to provide some degree of protection to this species. Anahuac is part of the Texas Chenier Plain Refuge Complex, for which FWS issued a Comprehensive Conservation Plan ("CCP") in May 2008 (FWS 2008).[16] This CCP failed to mention or prescribe protections for the Bay Skipper, despite the fact that many of the refuge's management actions (under the approved Alternative D) may affect the Skipper if conducted in its current or potential habitat. These include herbicide use, livestock grazing, prescribed fires, rice farming, water control, land management involving conventional farm machinery, and other activities. *Id*. at Chapter 4.

Texas

NatureServe ranks the Texas state status of this species as S1, which is defined as:

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[13] *See* **http://www.natureserve.org/explorer/ranking.htm#globalstatus** [Accessed November 2009].
[14] *Id*.
[15] *Id*.
[16] CCP is online at: **http://www.fws.gov/southwest/refuges/Plan/completeplans.html** [Accessed November 2009].

> **Critically Imperiled**—Critically imperiled in the jurisdiction because of extreme rarity or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the jurisdiction.[17]

While indicating biological imperilment, this ranking does not provide any regulatory or policy mechanisms to protect the Bay Skipper.

The Texas State Natural Heritage Program tracks occurrences of the Bay Skipper. While this is important to monitoring the status of this species, it does not provide any regulatory mechanisms to protect the Bay Skipper.

The Texas Comprehensive Wildlife Conservation Strategy ("CWCS") considers the Bay Skipper to be a Species of Concern.[18] It cites indiscriminate pesticide use as a potential threat. It recommends surveys of the species' habitat (TX CWCS at p. 776). The CWCS does not provide any regulatory protections to the Bay Skipper.

Mississippi

NatureServe ranks the Mississippi state status of this species as S1, the definition of which is discussed above for Texas. While indicating biological imperilment, this ranking does not provide any regulatory or policy mechanisms to protect the Bay Skipper.

The Mississippi State Natural Heritage Program tracks occurrences of the Bay Skipper. While this is important to monitoring the status of this species, it does not provide any regulatory mechanisms to protect the Bay Skipper.

V. Other natural or manmade factors affecting its continued existence

Climate Change. Climate change effects that threaten the Bay Skipper include extreme weather events, such as hurricanes, as well as rising sea levels. NatureServe (2009) noted that Hurricane Katrina likely destroyed the type locality of this species, in Mississippi. David Sarkozi (pers. comm. 2009) indicated that he has been unable to detect the species during surveys in Texas since Hurricane Ike. NatureServe (2009) stated that hurricanes have technically left the Bay Skipper with a globally historic status. Given that the Bay Skipper occupies sea level coastal areas, predicted sea level rises due to climate change will further inundate its habitat.

The Intergovernmental Panel on Climate Change (IPCC) underscored the risk facing coasts worldwide from climate change. The IPCC's (2007) report states:

> Coasts are projected to be exposed to increasing risks, including coastal erosion, due to climate change and sea level rise. The effect will be

[17] *See* **http://www.natureserve.org/explorer/ranking.htm#globalstatus** [Accessed November 2009].
[18] Online at: **http://www.tpwd.state.tx.us/publications/pwdpubs/pwd_pl_w7000_1187a/index.phtml** [Accessed December 2009].

> exacerbated by increasing human-induced pressures on coastal areas (*very high confidence*)…[19]

A recent U.S. report specifically focused on weather extremes due to climate change (Karl et al. 2008)[20] points out the increased power and frequency of Atlantic hurricanes and predicts that hurricane wind speeds, rainfall intensity, and storm surge levels will further increase. All of these effects could harm the Bay Skipper, just as Hurricanes Katrina, Rita, and Ike likely did.

The U.S. national report on *Global Climate Change Impacts in the United States* (Karl et al. 2009)[21] similarly describes the numerous threats facing coastal areas. The report states:

> Global climate change imposes additional stresses on coastal environments. Rising sea level is already eroding shorelines, drowning wetlands, and threatening the built environment…The destructive potential of Atlantic tropical storms and hurricanes has increased since 1970 in association with increasing Atlantic sea surface temperatures, and it is likely that hurricane rainfall and wind speeds will increase in response to global warming…Precipitation increases on land have increased river runoff, polluting coastal waters with more nitrogen and phosphorous, sediments, and other contaminants…All of these forces converge and interact at the coasts, making these areas particularly sensitive to the impacts of climate change.[22]

All of these threats pertain to the Bay Skipper.

A recent United Nations Environment Programme report on climate change science also describes the trend in sea level rise: while the average rate of global sea level rise during the 20th century was approximately 1.7 mm (.07 in) annually, it increased to 3.1 mm (.12 in) annually from 1993-2003, and since 2003 has been approximately 2.5 mm (.10 in) annually. The report explains the causes:

> Global average sea level is rising predominantly as a consequence of three factors—thermal expansion of warming ocean water, addition of new water from the ice sheets of Greenland and Antarctica and from glaciers and ice caps, and the addition of water from land hydrology. All three potential sources are undergoing

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[19]Intergovernmental Panel on Climate Change. 2007. Climate change 2007: synthesis report. Online at **http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf** [Accessed November 2009] [Attachment 9]. See p. 48.

[20]CCSP, 2008: *Weather and Climate Extremes in a Changing Climate. Regions of Focus: North America, Hawaii, Caribbean, and U.S.Pacific Islands.* A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research. [Thomas R. Karl, Gerald A. Meehl, Christopher D. Miller, Susan J. Hassol, Anne M. Waple, and William L. Murray (eds.)]. Department of Commerce, NOAA's National Climatic Data Center, Washington, D.C., USA, 164 pp. Online at: **http://www.climatescience.gov/Library/sap/sap3-3/final-report/sap3-3-final-all.pdf** [Accessed November 2009]. [Attachment 10]

[21]Karl, T.R., Melillo, J. M., and T.C. Peterson (eds). 2009. Global Climate Change Impacts in the United States, Cambridge University Press, 2009. Online at **http://www.globalchange.gov/whats-new/286-new-assessment-climate-impacts-us** [Accessed November 2009] [Attachment 11].

[22]*Id*. at p. 149.

changes of anthropogenic origin.[23]

The consequences of rising sea levels are directly relevant for the Bay Skipper and echo the findings of the 2009 US report on climate change (Karl et al. 2009: 27):

> The impacts of sea level rise will be felt through both an increase in mean sea-level and through an increase in the frequency of extreme sea-level events such as storm surges. These impacts include increased frequency and severity of flooding in low-lying areas, erosion of beaches, and damage to infrastructure and the environment, including wetlands and inter-tidal zones, and mangroves, with significant impacts on biodiversity and ecosystem function.

Biological Vulnerability. FWS has routinely recognized that small population size and restricted range - which describe the Bay Skipper's circumstances - increase the likelihood of extinction.[24] For the Langford's tree snail (*Partula langfordi*), the Service states:

> Even if the threats responsible for the decline of this species were controlled, the persistence of existing populations is hampered by the limited number of known individuals of this species. This circumstance makes the species more vulnerable to extinction due to a variety of natural processes. Small populations are particularly vulnerable to reduced reproductive vigor caused by inbreeding depression, and they may suffer a loss of genetic variability over time due to random genetic drift, resulting in decreased evolutionary potential and ability to cope with environmental change (Lande 1988; Pimm et al. 1988; Center for Conservation Update 1994; Mangel and Tier 1994).[25]

Here, FWS relies on citations not specific to *Partula langfordi* that indicate the threat to survival presented by limited population numbers, even without other known threats. The agency similarly notes for a snail called Sisi (*Ostodes strigatus*), "Even if the threats responsible for the decline of this species were controlled, the persistence of existing populations is hampered by the small number of extant populations and the small geographic range of the known populations."[26] Because the Bay Skipper occurs at 2 or fewer locations, has an extremely narrow range, and is vulnerable to extreme weather events, FWS should consider this butterfly's narrow range and small population size as itself a threat to the taxon.

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[23]McMullen, C.P. and Jabbour, J. 2009. Climate Change Science Compendium 2009. United Nations Environment Programme, Nairobi, EarthPrint. Online at **http://www.unep.org/compendium2009/** [Accessed November 2009] [Attachment 12]. See p. 26.

[24]See, e.g., Service candidate assessment forms for *Doryopteris takeuchii, Huperzia stemmermanniae, Megalagrion nesiotes, Melicope degeneri, Melicope hiiakae, Myrsine mezii, Ostodes strigatus, Partula langfordi, Peperomia subpetiolata, Phyllostegia bracteata*, and *Tryonia circumstriata*. Accessible via FWS website at **http://www.fws.gov/endangered/wildlife.html** [Accessed November 2009].

[25]See 2009 Listing Form for Partula langfordi at: **http://ecos.fws.gov/docs/candforms_pdf/r1/G0AI_I01.pdf** [Accessed November 2009] at p. 5.

[26]See 2009 Listing Form for *Ostodes strigatus* at: **http://ecos.fws.gov/docs/candforms_pdf/r1/G0A5_I01.pdf** [Accessed November 2009] at p. 4.

Pesticide Use. Pesticides applied to control mosquitoes may harm the Bay Skipper, particularly if Dibrome is used (NatureServe 2009). As the management plan for the Anahuac National Wildlife Refuge notes,

> Utilization of broad spectrum herbicides and pesticides in rice farming and pasture management in the project area may reduce abundance and diversity of invertebrates (FWS 2008: 225).

FWS does not provide further details on whether the herbicides or pesticides involved would specifically harm the Bay Skipper, as the plan fails to consider effects of actions on this species.

Summary

The Bay Skipper merits listing as an Endangered or Threatened species under the Endangered Species Act. The species faces overwhelming threats from extreme weather, rising sea levels, and other threats associated with climate change. With its limited range and low population levels, it is biologically vulnerable: a single weather event could eliminate remaining populations. Other threats include pesticide use and collection. It does not enjoy regulatory protections sufficient to address the threats it faces.

The Bay Skipper's range includes coastal areas in Texas and Mississippi and perhaps neighboring states. Petitioners know of only two populations: from Anahuac National Wildlife Refuge, TX and its type locality at Bay St. Louis, MS. This butterfly may also occur or have historically occurred in Louisiana and Alabama, but no occurrences have ever been found in those states. The impact of the threats described above is very real: Hurricane Katrina may have eliminated the type locality for the Bay Skipper, and this butterfly has not been documented at Anahuac National Wildlife Refuge after Hurricane Ike. Our petition is submitted with the hope that federal protection will be granted and will prevent this species' extinction. We believe ESA listing is vital to preserving and recovering this species.

Requested Designation

WildEarth Guardians and the Xerces Society for Invertebrate Protection hereby petition the U.S. Fish and Wildlife Service under the Department of Interior to list the Bay Skipper (*Euphyes bayensis*) as an Endangered or Threatened species pursuant to the Endangered Species Act. This listing action is warranted, given the numerous threats this species faces, as well as its likely extremely low population numbers. The Bay Skipper is likely threatened by all five of the ESA's listing factors: present and threatened destruction, modification and curtailment of habitat and range; overutilization; predation or disease; the inadequacy of existing regulatory mechanisms; and other natural or manmade factors affecting its continued existence.

Critical habitat

Given that threats to its coastal habitat are a significant cause of imperilment for the Bay Skipper, Petitioners request that critical habitat be designated for this species concurrent with final ESA listing.