

Hurricanes and Butterfly Trends in the Florida Keys: Implications for Sea Level Rise

**By Marc C. Minno, Ph. D.
Gainesville, Florida
mminno@bellsouth.net**

Decline and Loss of Butterflies in the Florida Keys

- 120 different kinds of butterflies have been reported from the Florida Keys.
- Butterflies have been disappearing from the Keys since the 1980s.
- There are currently more imperiled butterflies in southern Florida than any other region of the United States (nearly 20 taxa).
- Extreme events such as droughts, floods, hurricanes, frosts, fires, heat waves, exotic species, etc. greatly impact species and shape natural communities.

Florida Keys Resident Butterflies (44 spp.)

SKIPPERS (HESPERIIDAE)

Phocides pigmalion okeechobee (Mangrove Skipper)

Polygonus leo savigny (Hammock Skipper)

Ephyriades brunneus floridensis (Florida Duskywing)

Pyrgus albescens (White Checkered-Skipper)

Pyrgus oileus (Tropical Checkered-Skipper)

Cymaenes tripunctus (Three-spotted Skipper)

Hylephila phyleus (Fiery Skipper)

Wallengrenia otho (Southern Broken-Dash)

Atalopedes campestris huron (Sachem)

Euphyes pilatka klotsi (Palatka Skipper)

Asbolis capucinus (Monk Skipper)

Panoquina panoquinoides (Obscure Skipper)

SWALLOWTAILS (PAPILIONIDAE)

Battus polydamas lucayus Polydamas Swallowtail)

Heraclides cresphontes (Giant Swallowtail)

Heraclides aristodemus ponceanus (Schaus' Swallowtail)

WHITES & SULPHURS (PIERIDAE)

Ascia monuste phileta (Great Southern White)

Phoebis sennae eubule (Cloudless Sulphur)

Phoebis philea (Orange-barred Sulphur)

Phoebis agarithe maxima (Large Orange Sulphur)

Eurema lisa (Little Yellow)

Eurema दौरा दौरा (Barred Yellow)

Nathalis iole (Dainty Sulphur)

HAIRSTREAKS & BLUES (LYCAENIDAE)

Chlorostrymon simaethis (Silver-banded Hairstreak)

Calycopis cecrops (Red-banded Hairstreak)

Ministrymon azia (Gray Ministreak)

Strymon melinus (Gray Hairstreak)

Strymon martialis (Martial Scrub-Hairstreak)

Strymon acis bartrami (Bartram's Hairstreak)

Strymon istapa (Mallow Scrub-Hairstreak)

Electrostrymon angelia (Fulvous Hairstreak)

Brephidium isophthalma pseudofea (Eastern Pygmy Blue)

Leptotes cassius theonus (Cassius Blue)

Cyclargus thomasi bethunebakeri (Miami Blue)

Hemiargus ceraunus antibubastus (Ceraunus Blue)

BRUSHFOOTED BUTTERFLIES (NYMPHALIDAE)

Agraulis vanillae nigrior (Gulf Fritillary)

Dryas iulia largo (Julia)

Heliconius charithonia tuckerorum (Zebra Heliconian)

Junonia evarete (Mangrove Buckeye)

Junonia genoveva (Tropical Buckeye)

Anartia jatrophae guantanamo (White Peacock)

Phyciodes phaon (Phaon Crescent)

Eunica tatila tatilista (Florida Purplewing)

Danaus plexippus plexippus (Monarch)

Danaus gilippus berenice (Queen)

Strays or Temporary Colonizers from the Mainland (43 spp.)

SKIPPERS (HESPERIIDAE)

Urbanus proteus (Long-tailed Skipper)

Urbanus dorantes (Dorantes Skipper)

Erynnis horatius (Horace's Duskywing)

Nastra neamathla (Neamathla Skipper)

Lerema accius (Clouded Skipper)

Copaeodes minima (Southern Skipperling)

Polites baracoa (Baracoa Skipper)

Polites vibex (Whirlabout Skipper)

Euphyes pilatka pilatka (Palatka Skipper)

Calpododes ethlius (Brazilian Skipper)

Panoquina ocola (Ocola Skipper)

Panoquina panoquin (Salt Marsh Skipper)

SWALLOWTAILS (PAPILIONIDAE)

Battus philenor (Pipevine Swallowtail)

Papilio polyxenes asterius (Black Swallowtail)

Pterourus palamedes (Palamedes Swallowtail)

Eurytides marcellus floridensis (Zebra Swallowtail)

WHITES & SULPHURS (PIERIDAE)

Appias drusilla neumogenii (Florida White)

Pontia protodice (Checkered White)

Pieris rapae (Cabbage White)

Colias eurytheme (Orange Sulphur)

Aphrissa statira floridensis (Statira Sulphur)

Eurema dina helios (Dina Yellow)

Eurema nicippe (Sleepy Orange)

HAIRSTREAKS & BLUES (LYCAENIDAE)

Eumaeus atala florida (Atala)

Chlorostrymon maesites (Amethyst Hairstreak)

SNOOT BUTTERFLIES (LIBYTHEIDAE)

Libytheana carinenta bachmanii (American Snout)

BRUSHFOOTED BUTTERFLIES (NYMPHALIDAE)

Polygonia interrogationis (Question Mark)

Nymphalis antiopa (Mourning Cloak)

Vanessa virginiensis (American Lady)

Vanessa cardui (Painted Lady)

Vanessa atalanta rubria (Red Admiral)

Junonia coenia (Common Buckeye)

Anthanassa frisia (Cuban Crescent)

Phyciodes tharos (Pearl Crescent)

Euptoieta claudia (Variegated Fritillary)

Basilarchia archippus floridensis (Viceroy)

Eunica monima (Dingy Purplewing)

Marpesia petreus (Ruddy Dagger Wing)

Siproeta stelenes biplagiata (Malachite)

Anaea andria (Goatweed Leafwing)

Hermeuptychia sosybius (Carolina Satyr)

Neonympha areolata (Georgia Satyr)

Danaus eresimus tethys (Soldier)

Rare Strays from the Tropics (22 spp.)

SKIPPERS (HESPERIIDAE)

Gorgythion begga pyralina (Variegated Skipper)

Nyctelius nyctelius (Violet-banded Skipper)

SWALLOWTAILS (PAPILIONIDAE)

Heraclides andraemon andraemon (Bahamian Swallowtail)

Eurytides celadon (Cuban Kite Swallowtail)

WHITES & SULPHURS (PIERIDAE)

Ascia monuste evonima (Great Southern White)

Anteos maerula lacordairei (Yellow Angled-Sulphur)

Phoebis sennae sennae (Cloudless Sulphur)

Aphrissa orbis (Orbed Sulphur)

Eurema nise (Mimosa Yellow)

Eurema दौरa palmira (Caribbean Barred Yellow)

Eurema boisduvaliana (Boisduval's Yellow)

Kricogonia lyside (Lyside Sulphur)

HAIRSTREAKS & BLUES (LYCAENIDAE)

Strymon limenia (Disguised Scrub-Hairstreak)

Electrostrymon endymion (Ruddy Hairstreak)

BRUSHFOOTED BUTTERFLIES (NYMPHALIDAE)

Dryadula phaetusa (Banded Orange)

Hypolimnna misippus (Mimic)

Anartia chrysopelea (Cuban Peacock)

Diaethria clymena (Eighty-Eight Butterfly)

Hamadryas amphichloe diasia (Haitian Cracker)

Marpesia chiron (Many-banded Dagger Wing)

Marpesia eleucea (Antillean Dagger Wing)

Danaus plexippus megalippe (Caribbean Monarch)

Current Status of Butterflies in the Florida Keys

Extinct Butterflies



Hesperia meskei pinocayo
(Rockland Meske's Skipper)



Epargyreus zestos oberon
(Zestos Skipper)

Butterflies Extirpated from Florida & U.S.A.



Nickerbean Blue



Bahamian Swallowtail

Butterflies Extirpated from Florida Keys Weedy Habitats



Zarucco Duskywing



Eufala Skipper

Butterflies Extirpated from Florida Keys Hammocks



Amethyst Hairstreak



Ruddy Daggerwing



Hayhurst's Scallopwing



Cuban Crescent

Butterflies Extirpated from Florida Keys Pine Rocklands



Palmetto Skipper



Little Metalmark



Twin-spot Skipper



Florida Leafwing

Butterflies Nearly Gone



Schaus' Swallowtail



Miami Blue



Bartram's Scub-Hairstreak



Florida Purplewing



Keys Palatoka Skipper

Other Imperiled Butterflies



Florida Duskywing



Gray Ministreak



Florida White



Martial Scrub-Hairstreak



Silver-banded Hairstreak



Tropical Buckeye

More Imperiled Butterflies



Dingy Purplewing



Dina Yellow



Malachite



Atala

Causes of Decline and Loss

- **Habitat loss, fragmentation, and change (roads)**
- **No land management or inappropriate land management**
- **Exotic predators/parasitoids (ants)**
- **Impacts to host and nectar plants**
- **Pesticides**
- **Extreme weather events (hurricanes, frosts, etc.)**

Recent Hurricanes



Hurricane Andrew August 1992



Hurricane Wilma October 2005

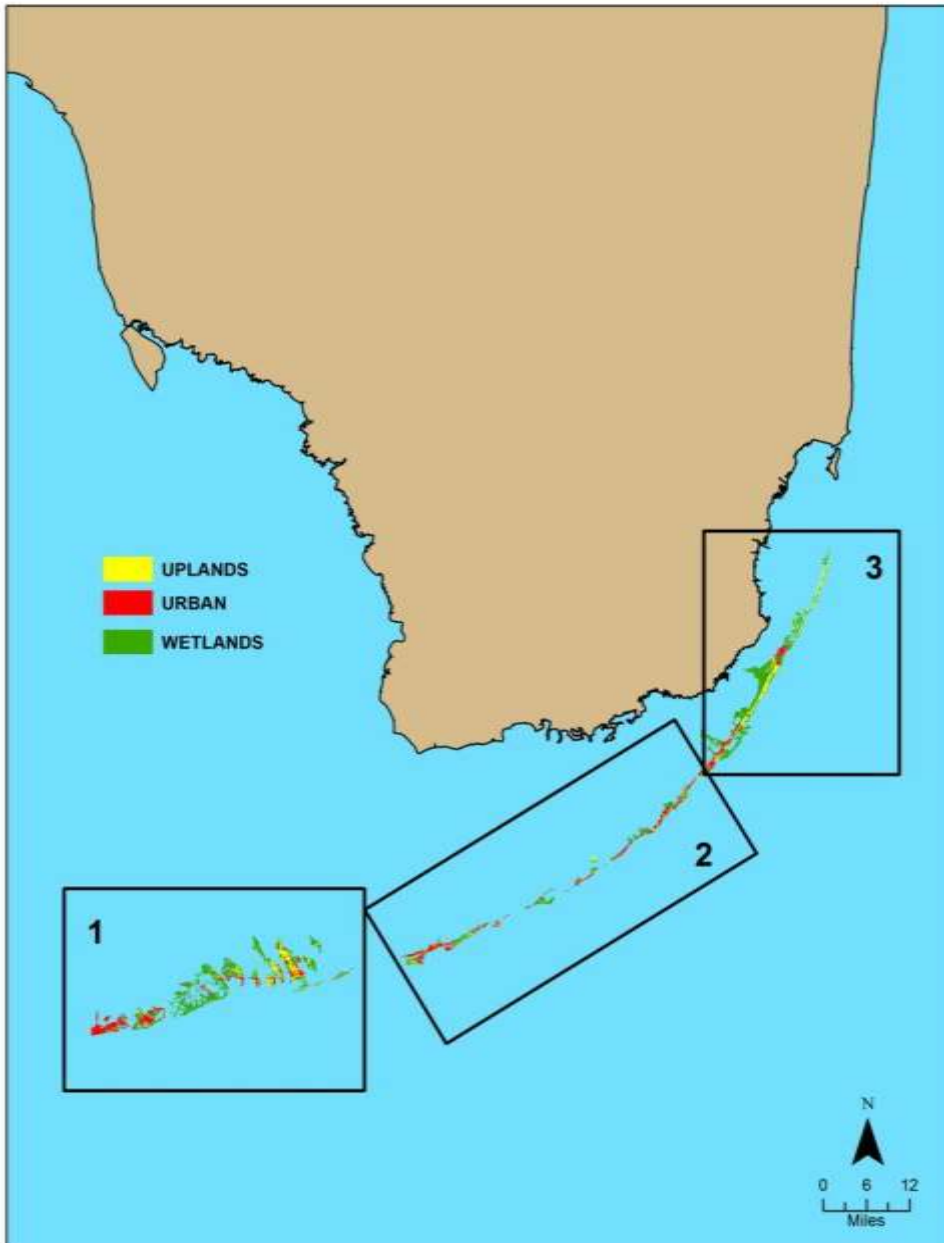
Elevation Analysis

Overlaid GIS Grids

2004 Land Cover data reclassified as upland, wetland, and urban.

Digital Elevation Model (DEM)

Maps and Figures by
Steve Brown, GIS Analyst



Lower Keys Extent of Flooding Events by Land Cover Type

2004 Land Cover



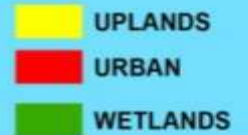
5 Foot Flood



1 Foot Flood

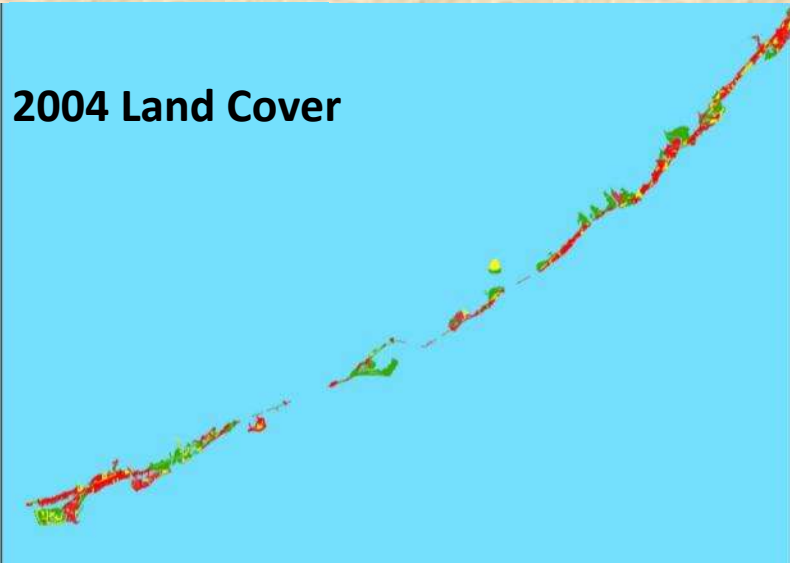


10 Foot Flood



Middle Keys Extent of Flooding Events by Land Cover Type

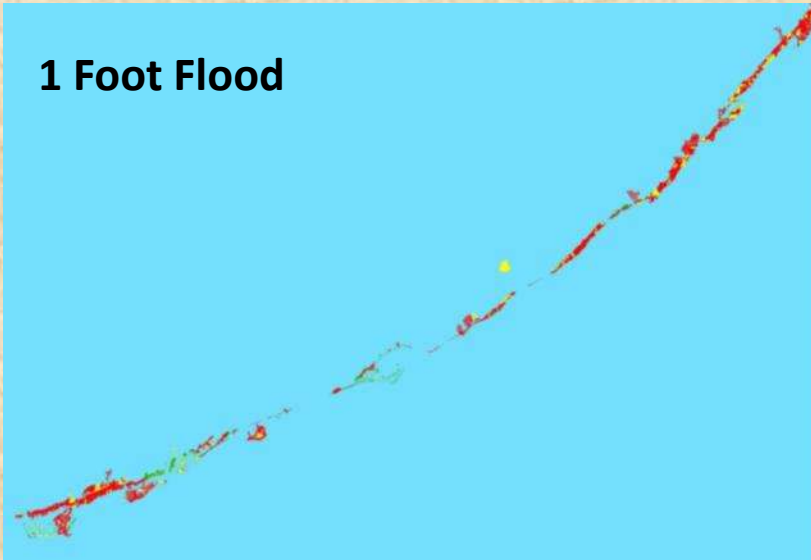
2004 Land Cover



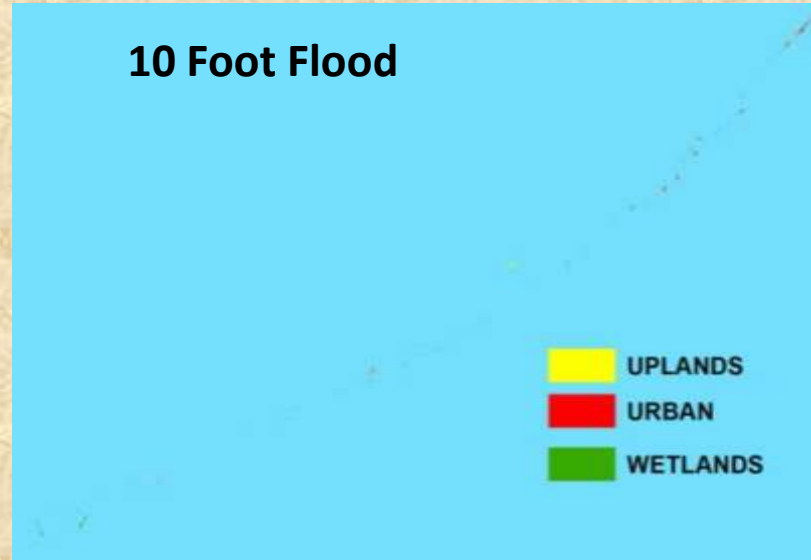
5 Foot Flood



1 Foot Flood

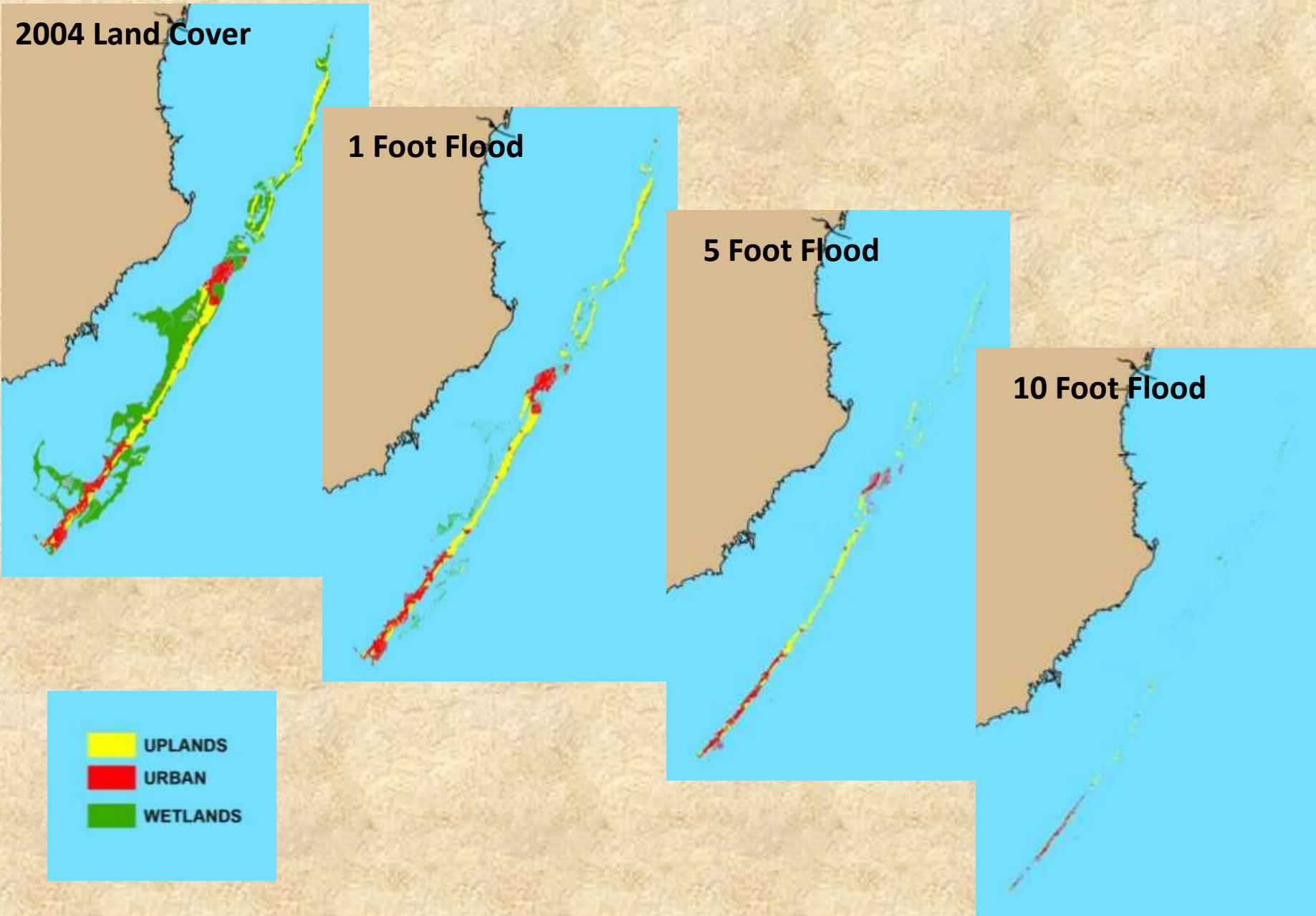


10 Foot Flood



- UPLANDS
- URBAN
- WETLANDS

Upper Keys Extent of Flooding Events by Land Cover Type



Extent of Flooding Events by Land Cover Type

Type	Total Acres	1 ft Flood		5 ft Flood		10 ft Flood	
		Acres	%	Acres	%	Acres	%
URBAN	19,106.8	1,500.2	7.9	14,362.7	75.2	18,032.5	94.4
UPLANDS	13,315.0	3,107.2	23.3	10,565.2	79.3	12,964.8	97.4
WETLANDS	40,338.4	34,167.3	84.7	39,343.7	97.5	39,470.9	97.8
TOTALS	72,760.2	38,774.7	53.3	64,271.6	88.3	70,468.2	96.8

- Majority of the Keys are at low elevation with wetland vegetation.
- 60% of uplands are urban (about 2/3 of islands connected by roads).
- In 1 ft flood, 85% of wetlands, 25% of uplands, but only 10% of urban affected.
- In 5 ft flood, 100% of wetlands, 80% of uplands, 75% of urban affected.
- In 10 ft flood, 100% affected.

Wetland Butterfly Trends

Imperiled Species

Euphyes pilatka klotsi

Resident Species

Phocides pigmalion okeechobee
Atalopedes campestris huron
Panoquina panoquinoides
Brephidium pseudofea isophthalma
Junonia evarete

Transient Species

None

- These butterflies would be expected to be the most impacted by hurricanes.
- All survived, but have been exceedingly localized and at low abundance.
- The Palatka Skipper is imperiled, currently only occurs on Big Pine Key, and was nearly wiped out by Hurricane Wilma.

Trends of Butterflies Occurring in Both Uplands & Wetlands

Imperiled Species

Strymon martialis

Resident Species

Ascia monuste
Strymon istapa
Danaus gilippus ?
Danaus plexippus

Transient Species

Anartia jatrophae
Junonia coenia
Danaus eresimus
Danaus plexippus

- The Martial Scrub-Hairstreak has disappeared from the Upper Keys.

Upland Butterfly Trends

Imperiled Species

Ephryiades brunneus floridensis
Heraclides aristodemus ponceanus
Appias drusilla neumoenigii
Hemiargus thomasi bethunebakeri
Chlorostymon simaethus
Strymon acis bartrami
Ministrymon azia
Eunica tatila tatilista

Resident Species

Polygonus leo
Pyrgus albescens
Pyrgus oileus
Asbolis capucinus
Cymaenes tripunctus
Hylephila phyleus
Wallengrenia otho
Heraclides crespontes
Phoebis agarithe
Phoebis philea
Hemiargus ceraunus
Leptotes cassius
Calycopsis cecrops
Electrostymon angelia
Strymon melinus
Dryas iulia
Heliconius charitonius
Agraulis vanillae

Transient Species

Urbanus dorantes
Urbanus proteus
Eurema दौरa
Nathalis iole
Phoebis sennae
Eurema lisa
Phyciodes phaon

- Many of these butterflies have large fluctuations in abundance.
- The imperiled species mostly continue to decline

Species That Have Disappeared From the Keys (All upland)

SPECIES	YEAR LOST
<i>Staphylus hayhurstii</i> (Hayhurst's Scallopwing)	1980
<i>Euphyes arpa</i> (Palmetto Skipper)	1980
<i>Calephelis virginiensis</i> (Little Metalmark)	1980
<i>Hesperia meskei</i> (Meske's Skipper)	2000
<i>Epargyreus zestos</i> (Zestos Skipper)	2005
<i>Oligoria maculata</i> (Twinspot Skipper)	2005
<i>Heraclides andraemon</i> (Bahamian Swallowtail)	2005
<i>Chlorostrymon maesites</i> (Amethyst Hairstreak)	2005
<i>Marpesia petreus</i> (Ruddy Daggerwing)	2005
<i>Phyciodes frisia</i> (Cuban Crescent)	2005
<i>Eunica monima</i> (Dingy Purplewing)	2005
<i>Anaea troglodyta floridalis</i> (Florida Leafwing)	2005
<i>Erynnis zarucco</i> (Zarucco Duskywing)	2010
<i>Lerodea eufala</i> (Eufala Skipper)	2010
<i>Cyclargus ammon</i> (Nickerbean Blue)	2010
<i>Junonia genoveva</i> (Tropical Buckeye)	2010

Red font = Extinct

Blue font = Extirpated

Recommendations

Short-term

- Identify, monitor, and track remaining at-risk butterfly populations and protect them wherever possible
- Preserve genetic material for future research
- Study impacts of hurricanes and tropical storms
- Coordinate conservation among agencies and NGOs

Long-term

- Develop conservation plans for 20 years in the future and update the plans every 5 years

Questions ?

Marc C. Minno, Ph. D.

Gainesville, Florida

mminno@bellsouth.net