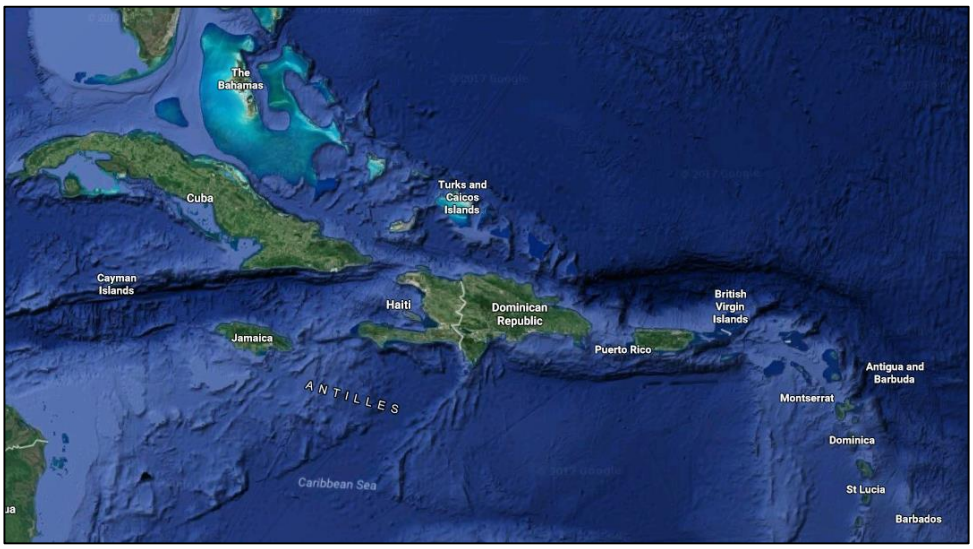
Vector Hazard Report: Mosquitoes of the Caribbean










WRAIR
Walter Reed Army Institute of Research
Soldier Health • World Health

All material in this brief is provided for your information only and may not be construed as medical advice or instruction. No action or inaction should be taken based solely on the contents of this information; instead, readers should consult appropriate health professionals on any matter relating to their health and well-being.

WRBU
WALTER REED BIOSYSTEMATICS UNIT
Know the vector, know the threat

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Reference Map

Countries included in this report:

Anguilla	Martinique
Antigua and Barbuda	Montserrat
Barbados	Puerto Rico
British Virgin Islands	Saba
Cuba	Saint Barthelemy
Dominica	Saint Kitts and Nevis
Dominican Republic	Saint Lucia
Grenada	Saint Martin
Guadeloupe	Saint Vincent and the Grenadines
Haiti	U.S. Virgin Islands
Jamaica	

Click each country to view guidance from CDC

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Vector Ecology

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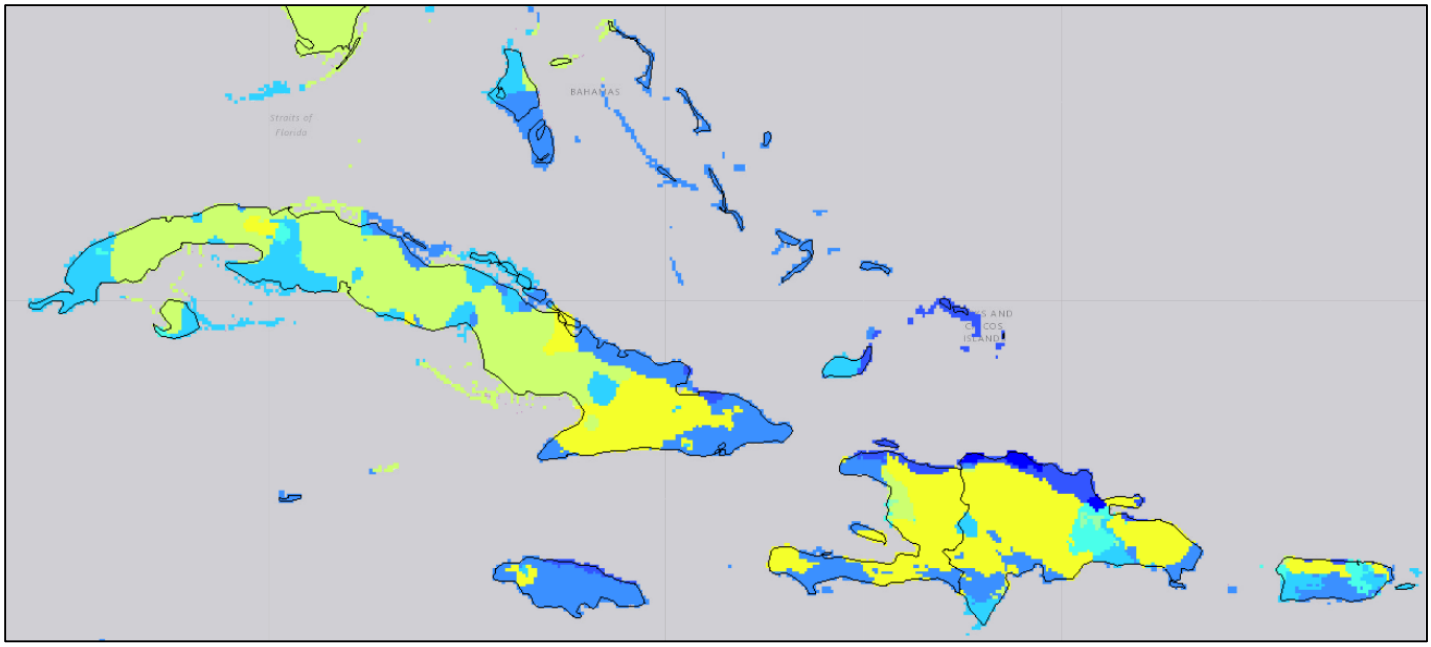
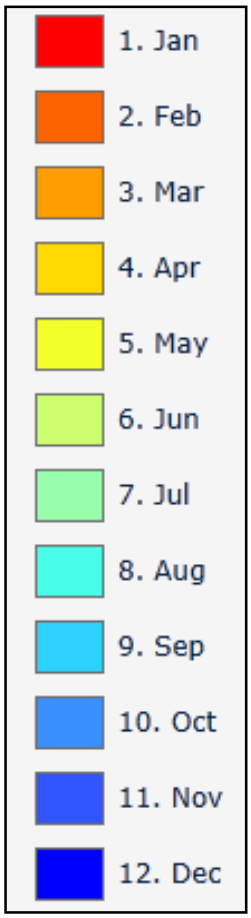
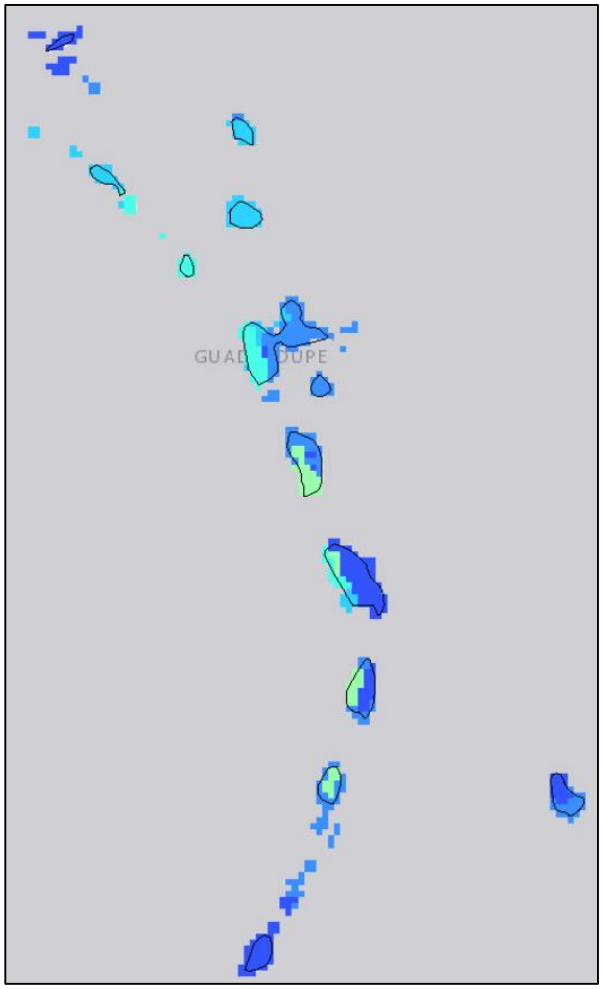
Month of Maximum Precipitation

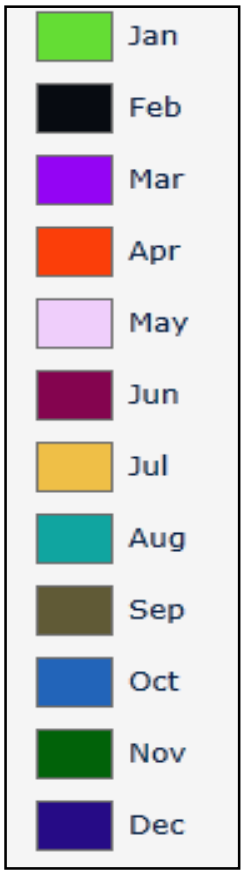


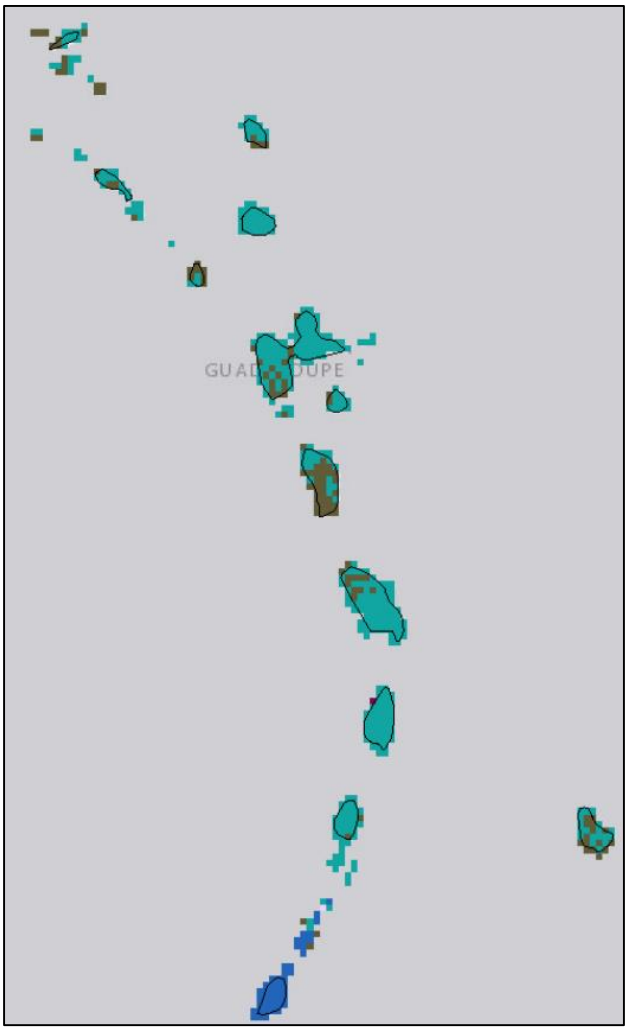




Data provided by [WorldClim]

Month of Maximum Temperature





Data provided by [WorldClim]

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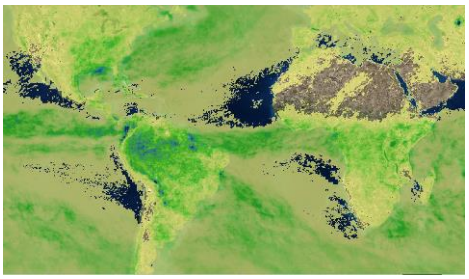
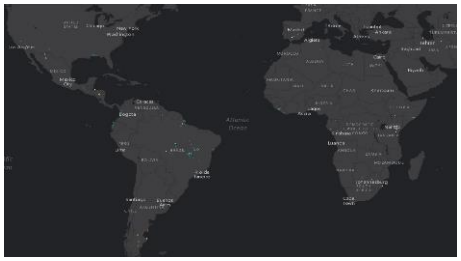
Monthly Climate Maps

Click here to view the maps described below

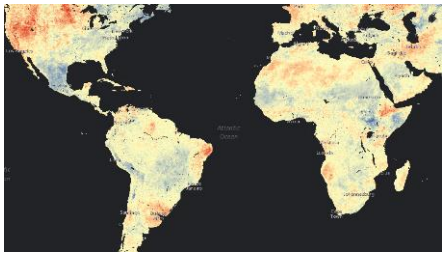


Rainfall
This map shows the accumulated rainfall for the past month. Updated monthly.
-NASA Earth Observations

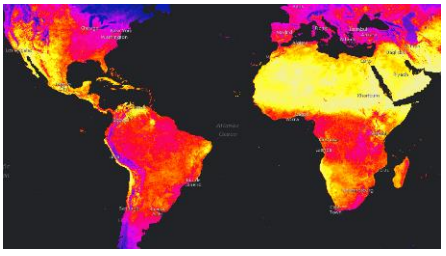
Consistent Above and Below Average Precipitation
Areas with consistent above average monthly rainfall over the past 3 months may indicate increased mosquito breeding sites which may lead to increased mosquito-borne disease transmission. Areas with consistent below average rainfall may also indicate increased water storage or ponding which can provide additional habitat for mosquito species that lay eggs in human containers, protected micro environments, or long lasting pools. Updated monthly. -NASA Earth Observations.



Drought Breaking Rain
Areas receiving above average rainfall for the past month and below average rainfall for the previous 12 months. Drought breaking rain may indicate recent suitable conditions for vectors and diseases in a stressed environment or human population. Updated monthly. -WorldClim, Giovanni online data system NASA GES DISC, Tropical Rainfall Measuring Mission (TRMM).



Temperature anomaly
This map shows where earth's temperatures were warmer or cooler in the daytime than the average temperatures over the past month in relation to the same month from 2001-2010. Updated monthly.
-NASA Earth Observations



Land Surface Temperature
This map shows the temperature of the earth's land surface during the daytime. Updated monthly.
-NASA Earth Observations

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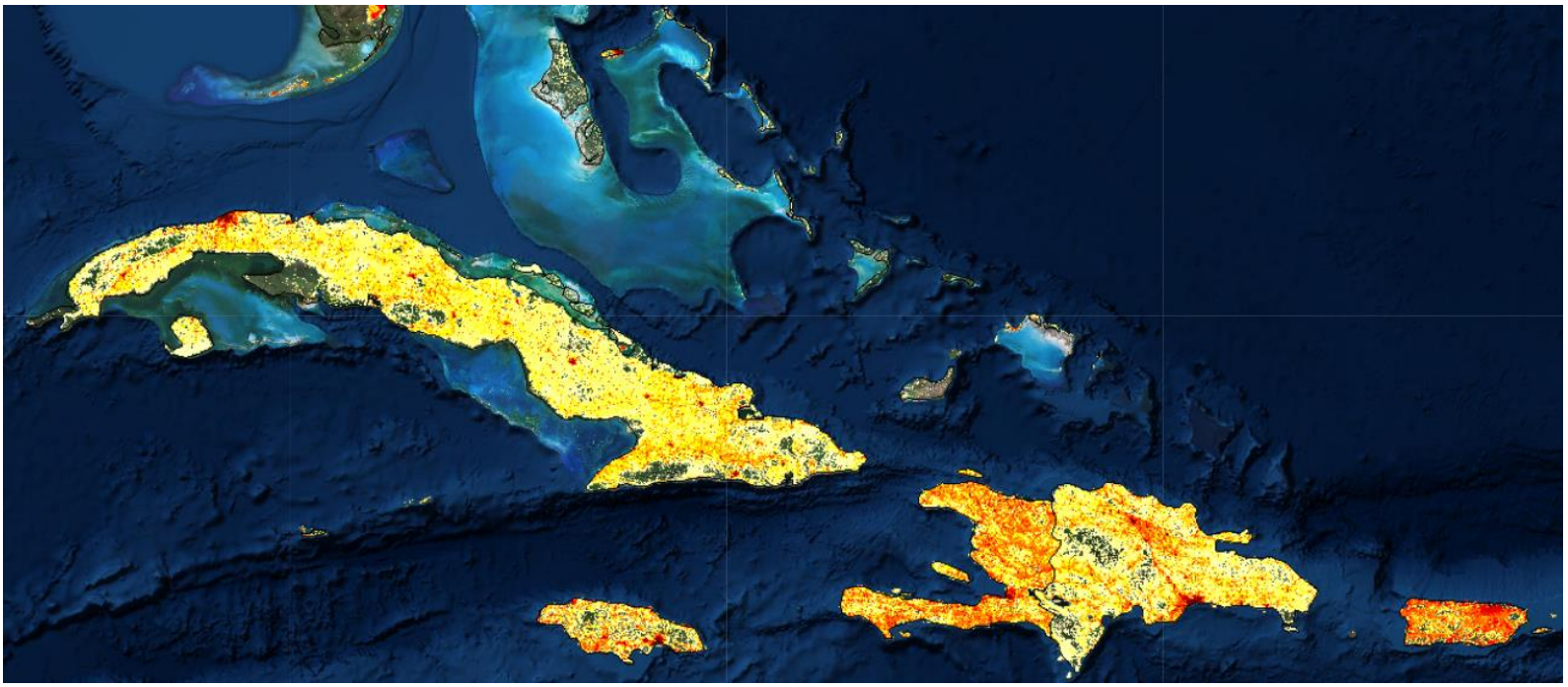
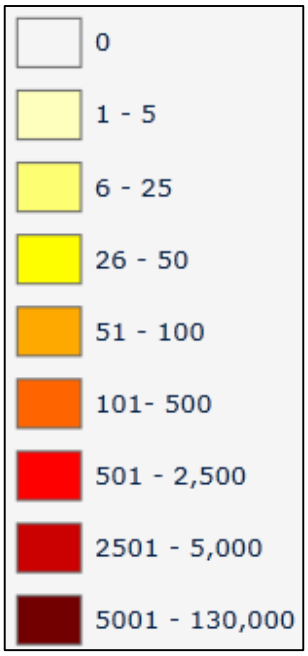
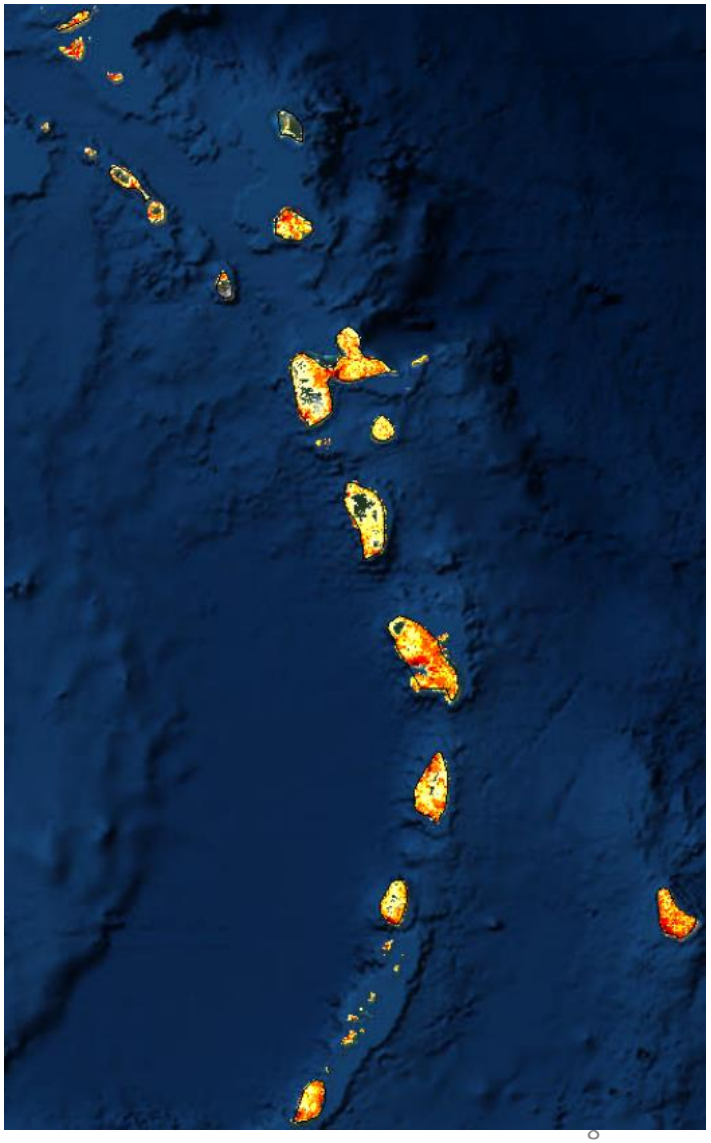
Human Density







LandScan 2011, Human population per square km.

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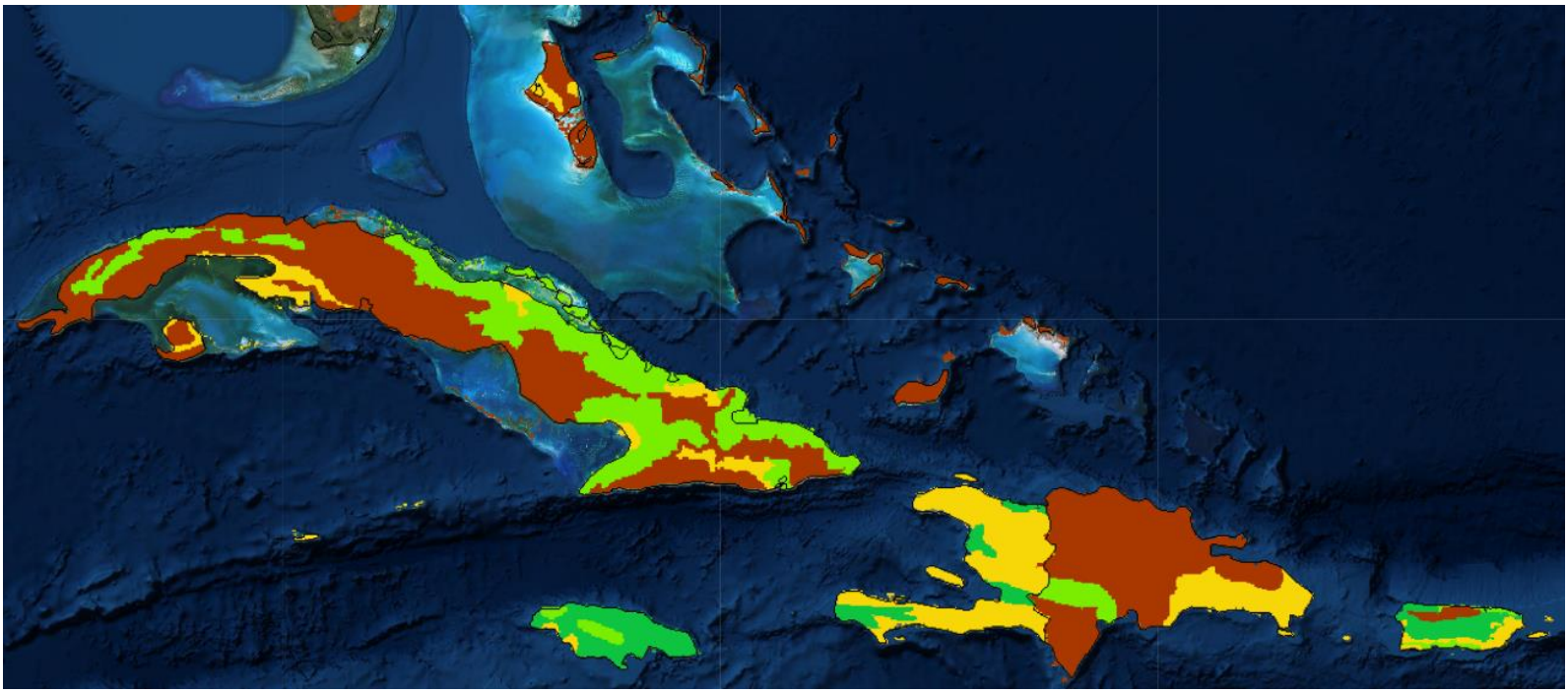
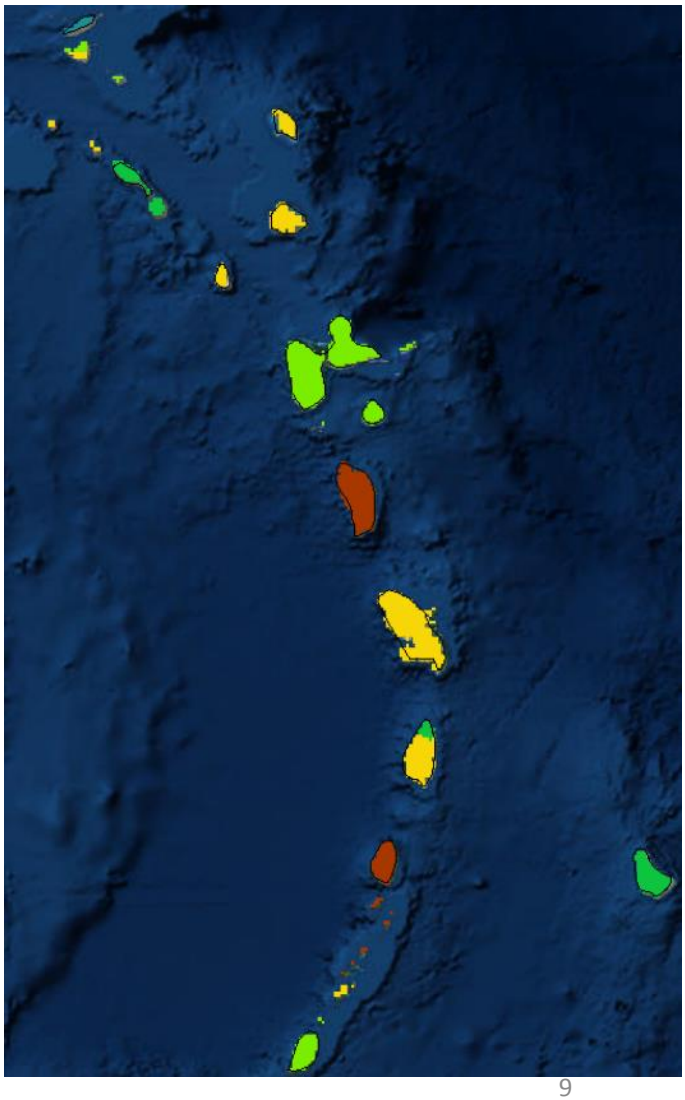
Soil Drainage





Soil Drainage (Harmonized World Soil Database 1.1; 0.02 Deg resolution)

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Mosquito-Borne Disease Hazards of The Caribbean

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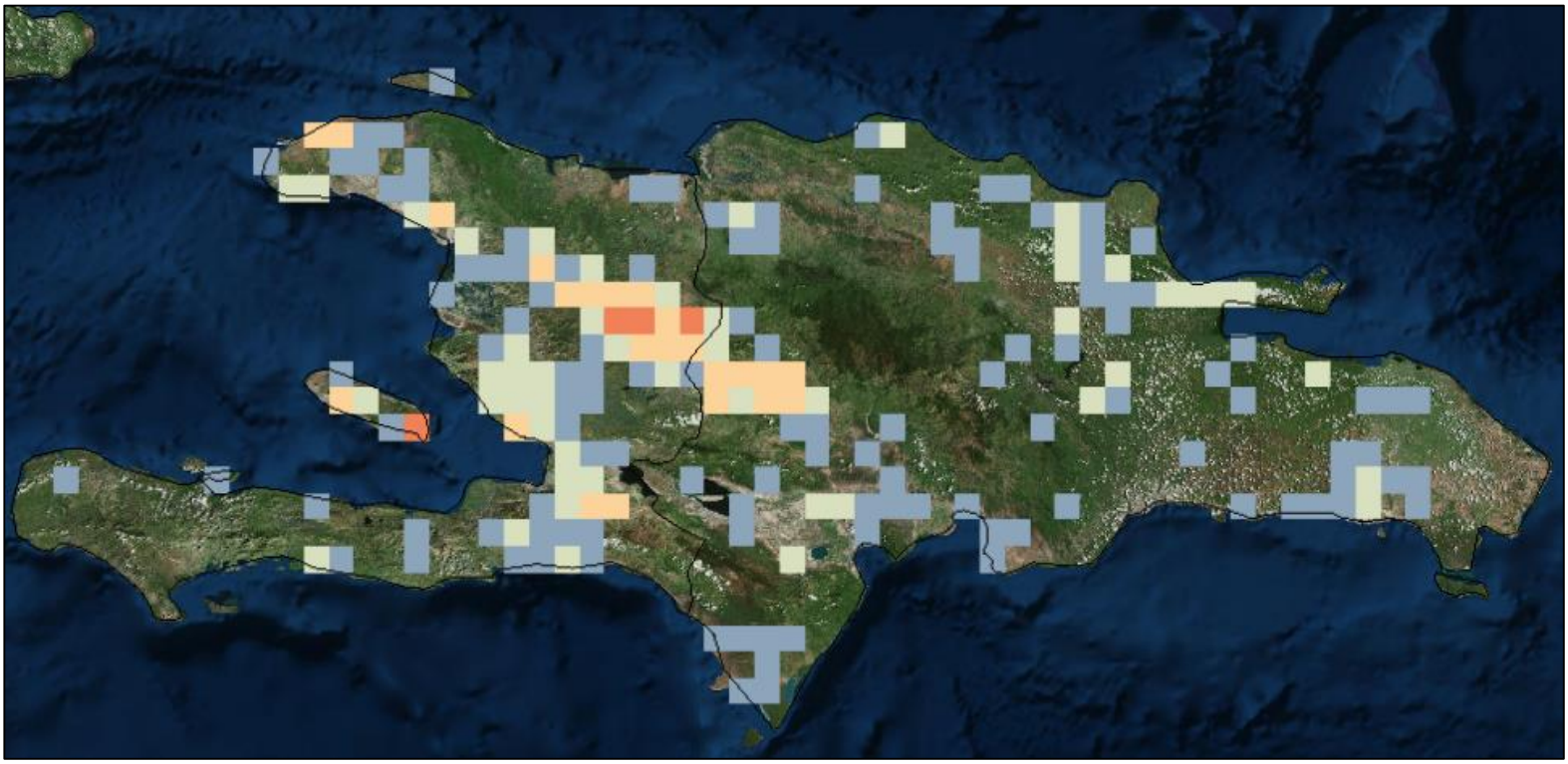
Aedes Arboviruses Known from Greater and Lesser Antilles

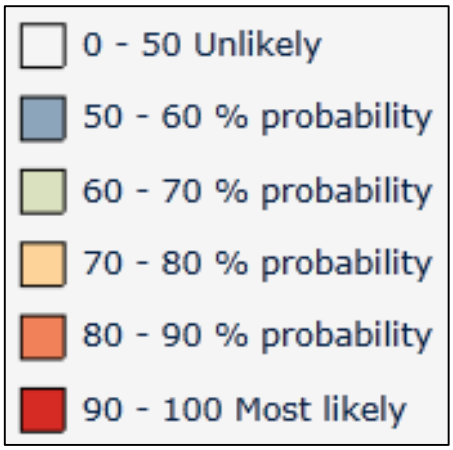
Virus	Abbreviation	Virus	Abbreviation
Apeu virus	APEUV	Melao virus	MELV
Banzi virus	BANV	Mucambo virus	MUCV
Barmah Forest virus	BFV	Murray Valley encephalitis virus	MVEV
Bunyamwera virus	BUNV	Murutucu virus	MURV
Bussuquara virus	BSQV	Nyando virus	NDOV
Bwamba virus	BWAV	O'nyong'nyong virus	ONNV
California encephalitis virus	CEV	Oriboca virus	ORIV
Caraparu virus	CARV	Oropouche virus	OROV
Catu virus	CATUV	Ossa virus	OSSAV
Chagres virus	CHGV	Restan virus	RESV
Chikungunya virus	CHIKV	Rift Valley Fever virus	RVFV
Cotia virus	COTV	Ross River virus	RRV
Calovo virus	CVOV	St. Louis encephalitis virus	SLEV
Dengue virus	DENV	Sepik virus	SEPV
Eastern equine encephalitis virus	EEEV	Semliki Forest virus	SFV
Everglades virus	EVEV	Shuni virus	SHUV
Ganjam virus	GANV	Sindbis virus	SINV
Germiston virus	GERV	Spondweni virus	SPOV
Guama virus	GAMV	Tahyna virus	TAHV
Guaroa virus	GROV	Tataguine virus	TATV
Ilesha virus	ILEV	Tensaw virus	TENV
Ilheus virus	ILHV	Venezuelan equine encephalitis virus	VEEV
Inkoo virus	INKV	Western equine encephalitis virus	WEEV
Itaqui virus	ITQV	West Nile virus	WNV
Japanese encephalitis virus	JBEV	Wesselsbron virus	WSLV
Kunjin virus	KUNV	Wyeomyia virus	WYOV
La Crosse virus	LACV	Wyeomyia virus	WYOV
Madrid virus	MADV	Yellow fever virus	YFV
Marituba virus	MTBV	Zika virus	ZIKAV
Mayaro virus	MAYV		

Sources:

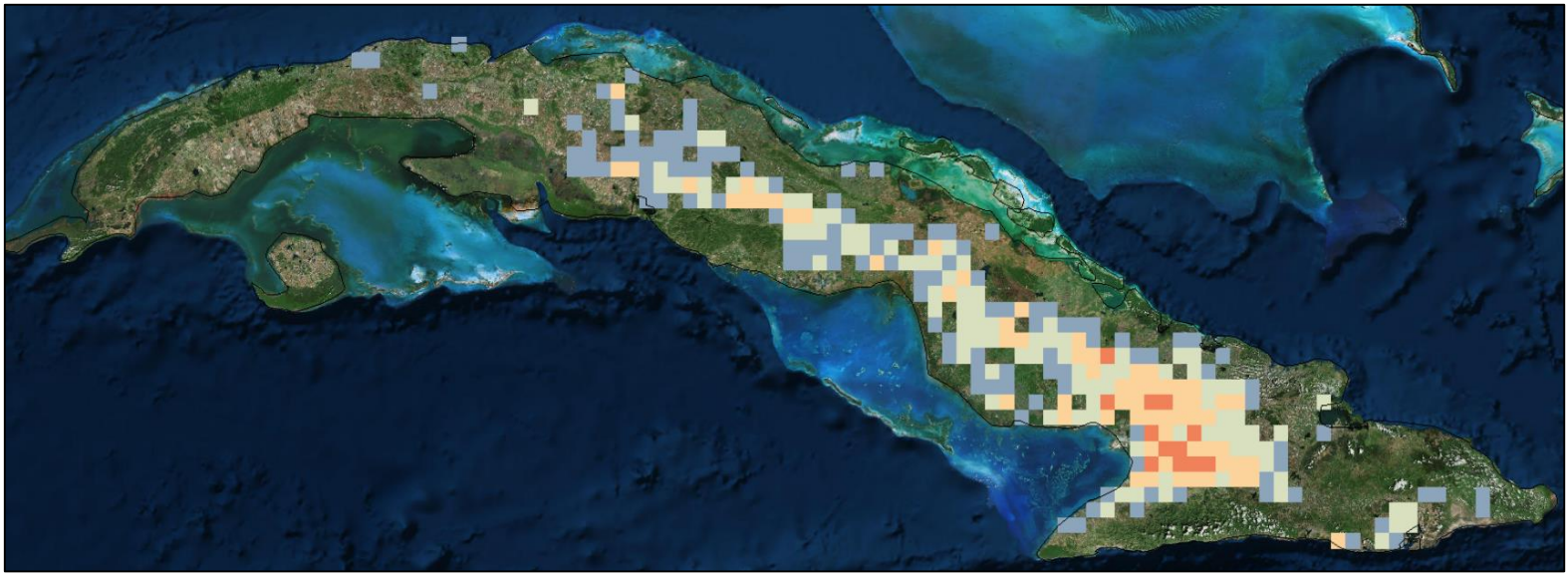
1. White GB. Appendix IV. Medical Acarology and Entomology. In: Cook GC, Zumla A, editors. Manson's Tropical Diseases, 21st Edition. W.B. Saunders; 2003; p 1747.
2. Arbovirus Catalog. Accessed July, 2016. Atlanta GA: Centers for Disease Control and Prevention.

Yellow Fever Risk





Predicted probability of occurrence of yellow fever virus. Spatial Ecology and Epidemiology Research Group, University of Oxford.



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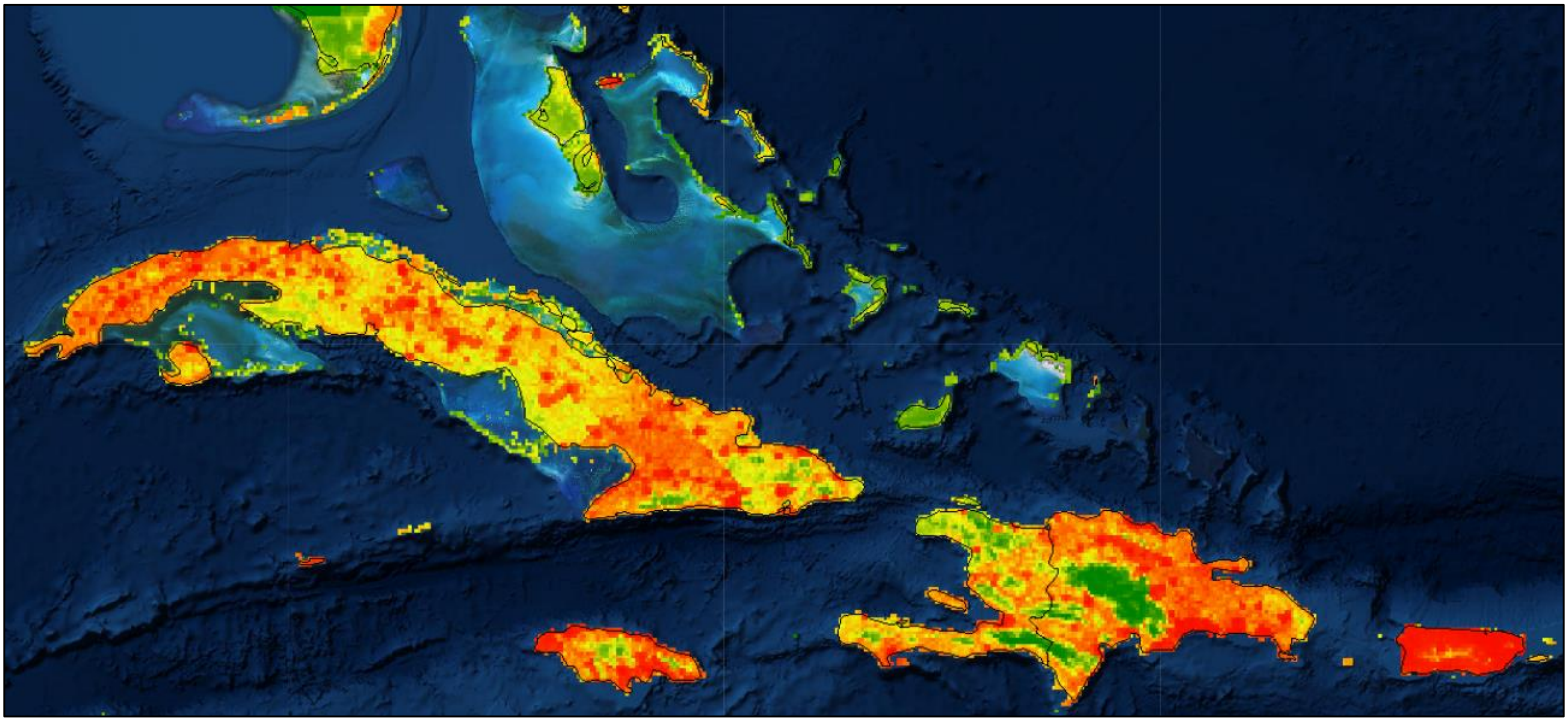
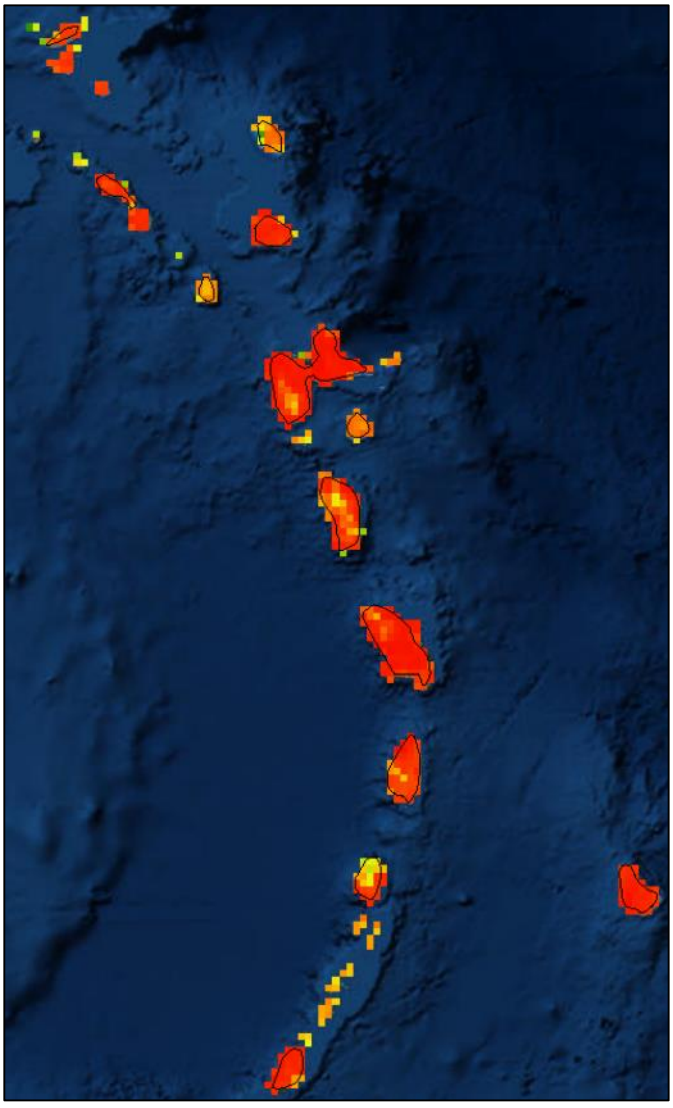
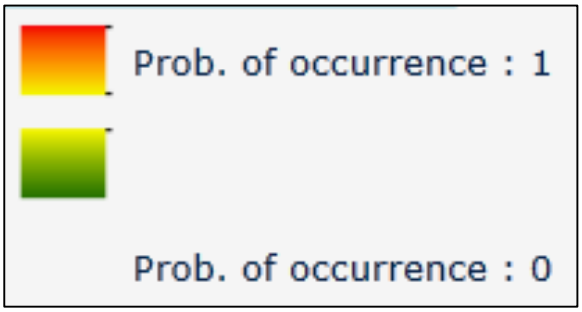
Dengue Fever Risk







Dengue Prediction Model
Bhatt, S. et al. 2013

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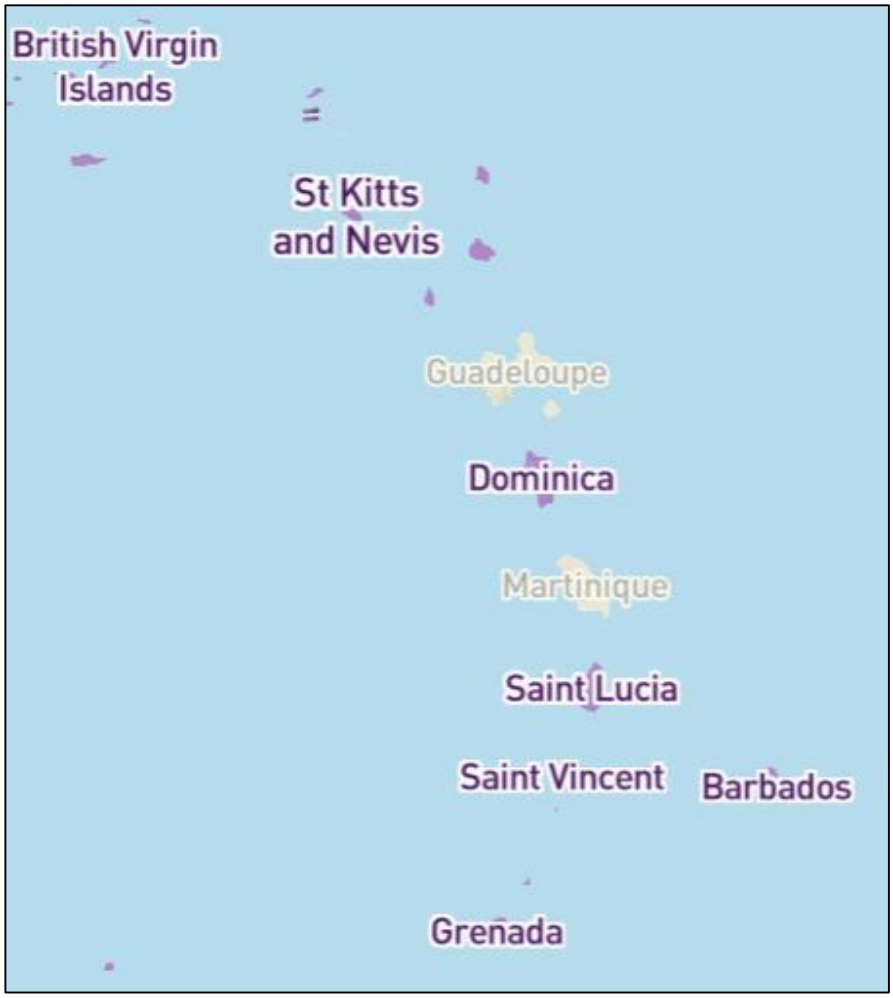
Zika Virus Risk

CDC, World Map of Areas with Risk of Zika, Accessed October, 2017



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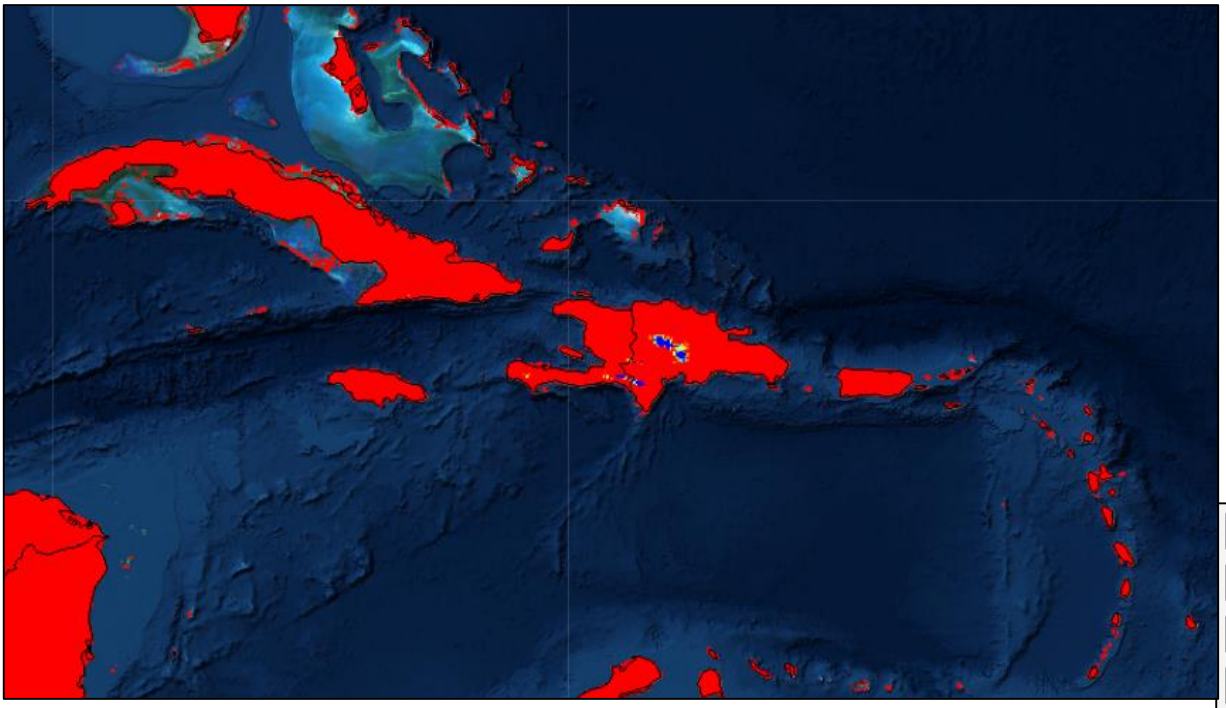
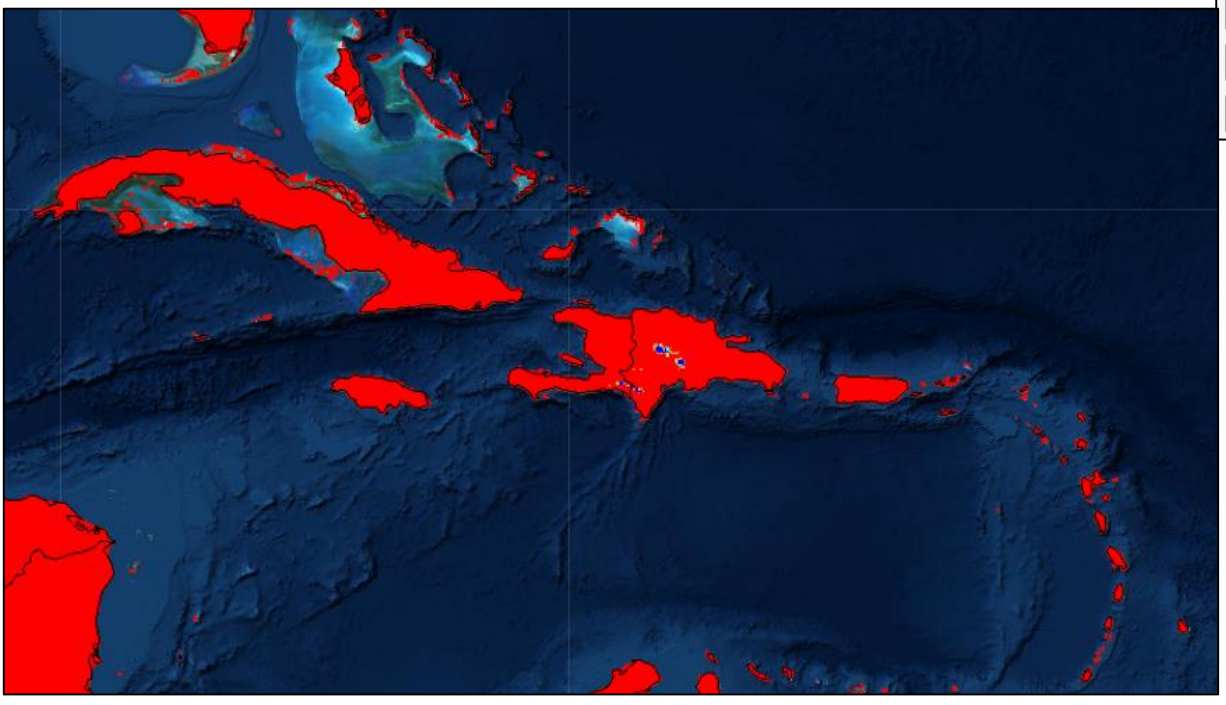
Malaria Risk Maps

The number of infectious days (by month) in which the annual temperature regime could support malaria infection (Gething et al. 2011).



Plasmodium falciparum



Plasmodium vivax

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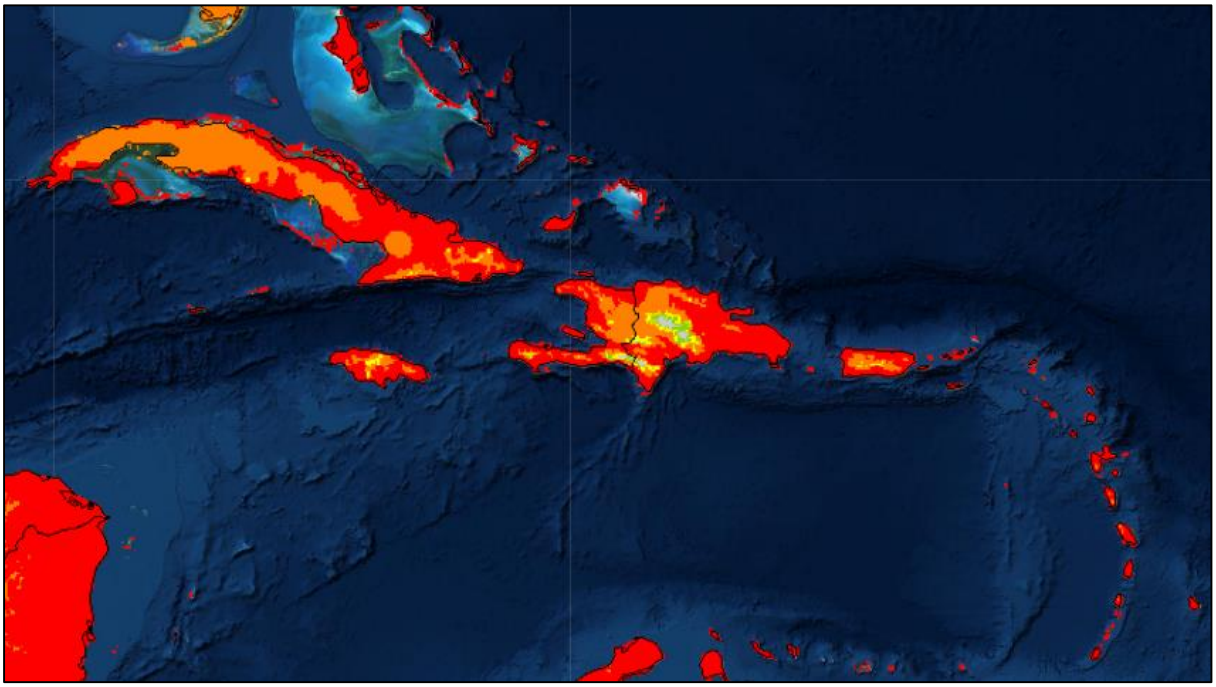
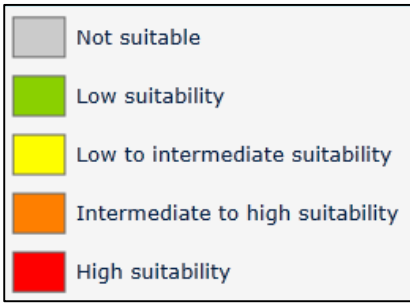
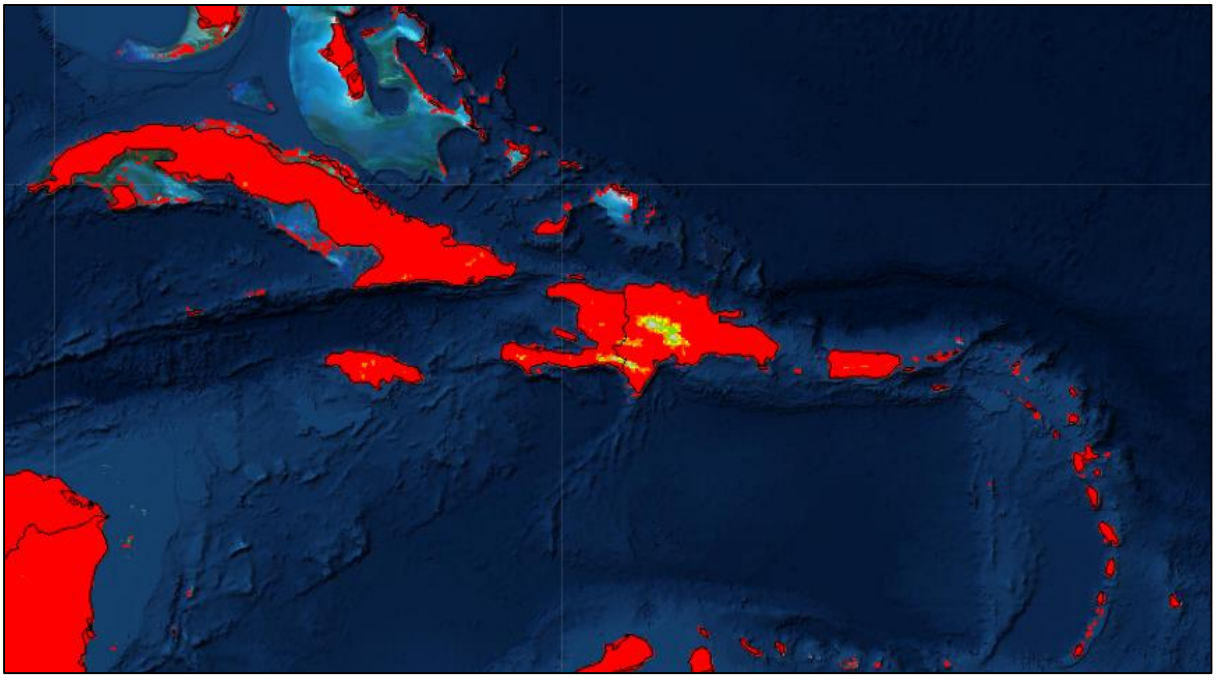
Malaria Risk Maps

The normalized Z(T) index of temperature suitability that incorporates the duration and degree of suitability across an average year (Gething et al. 2011).



Plasmodium falciparum





Plasmodium vivax

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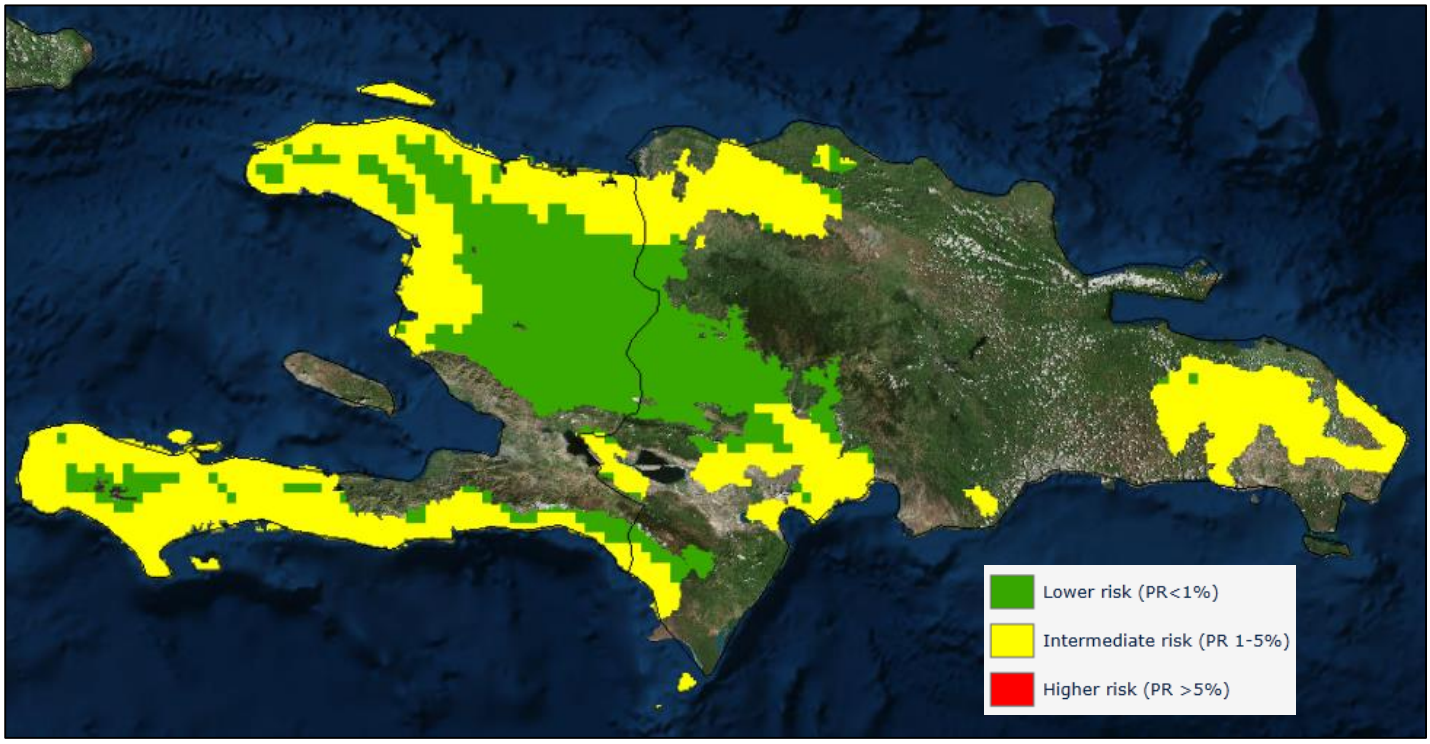
Malaria Risk Maps



Stratified estimate proportion of the general population that are infected with *Plasmodium falciparum* at any one time averaged over the 12 months of 2010. -Malaria Atlas Project. **Note: Hispaniola is the only area predicted to have current *P. falciparum* infections.**

Malaria (*Plasmodium falciparum*) Entomological Inoculation Rate, 2010 Number of expected bites from infected mosquitoes per person, per year (Gething et al. 2011). **Note: Hispaniola is the only area predicted to have current *P. falciparum* infections.**

Mosquitoes of Medical Importance

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Aedes (*Stg.*) *aegypti* (Linnaeus, 1762)

Bionomics:

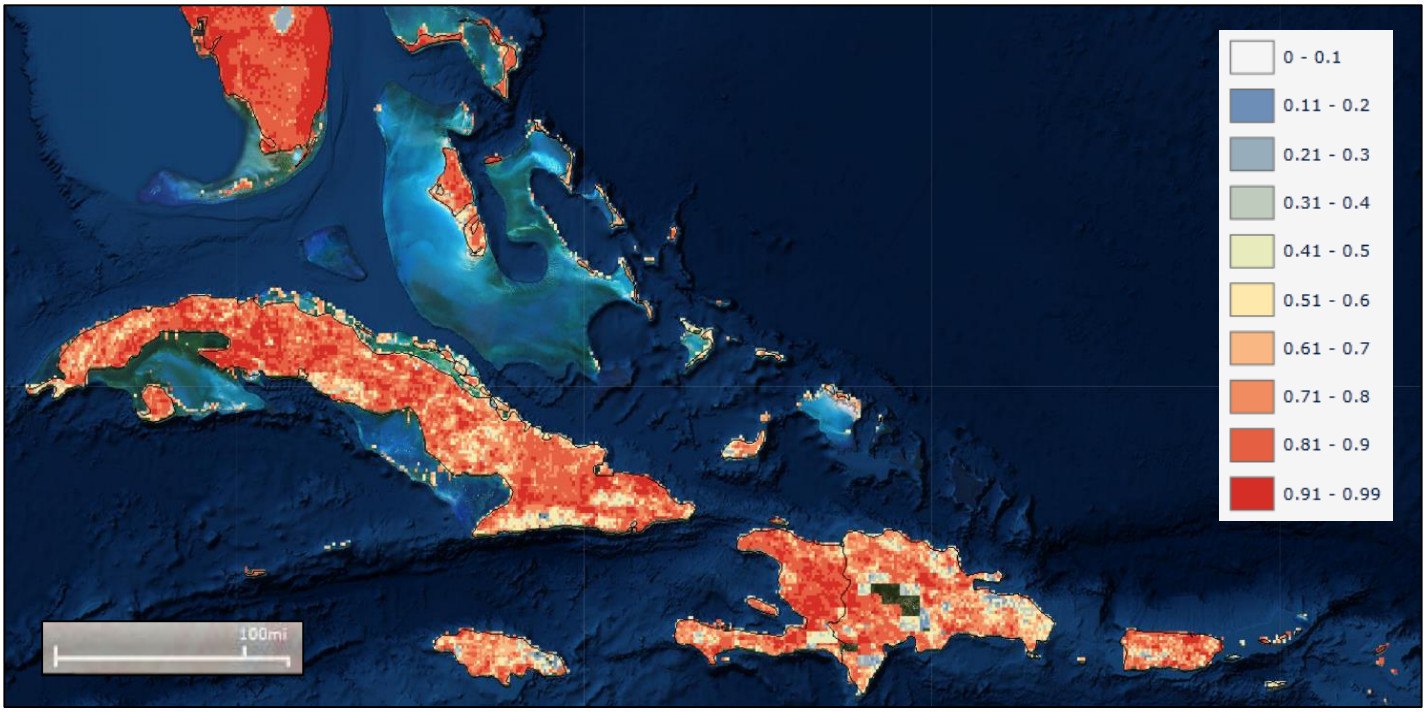
Mostly found in close association with humans, *Ae. aegypti* will use any and all natural and artificial containers as larval breeding sites. Away from urban areas the species tends to favor pools in river beds, tree stumps, tree holes and natural containers. Females are primarily day biters and readily enter buildings to feed. They have also been taken in lesser numbers at night (Christophers 1960).

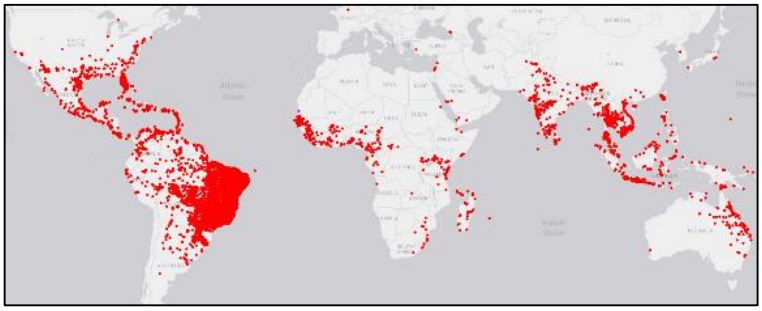
Medical Importance:

Primary vector of Yellow Fever, Dengue Fever, Chikungunya Virus and Zika Virus (Christophers 1960).

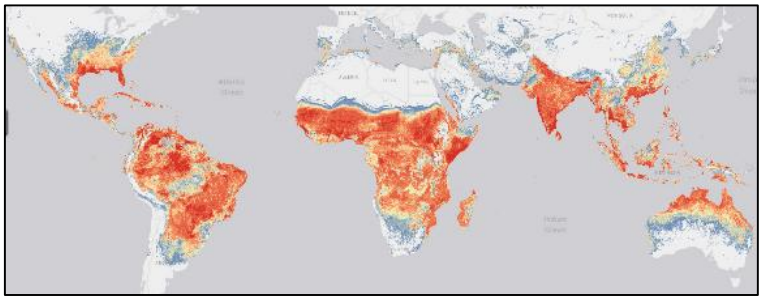
WRBU Species Page

Aedes (*Stg.*) *aegypti* (Linnaeus, 1762)





VectorMap data points for *Ae. aegypti*, 21, 768 records as of October 2017.



Boosted regression tree model of habitat suitability for *Ae. aegypti*, Global. Kraemer et al. 2016.

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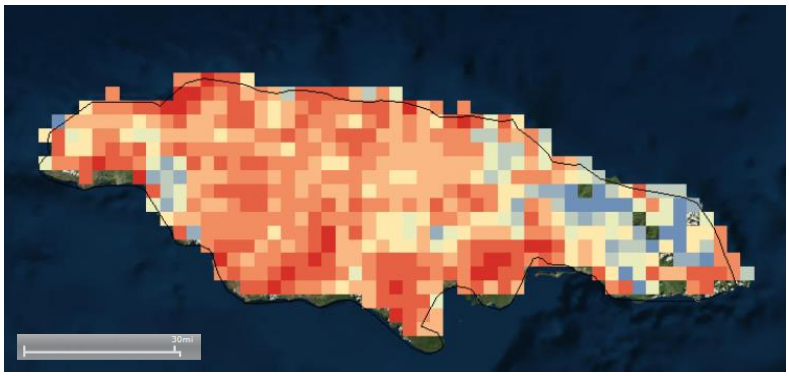
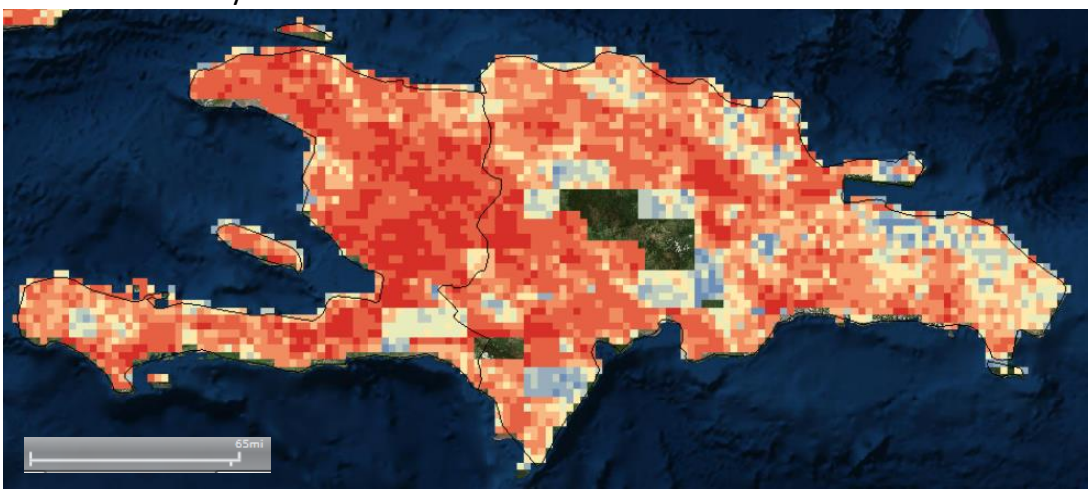
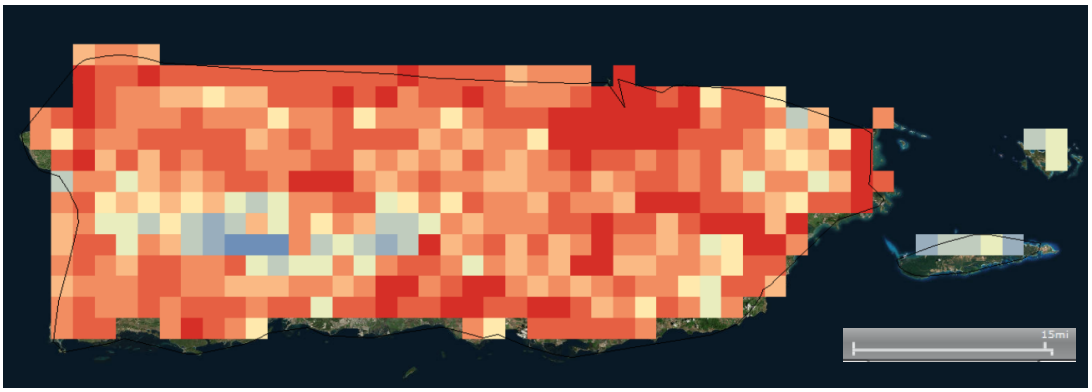
Aedes (*Stg.*) *aegypti* (Linnaeus, 1762)



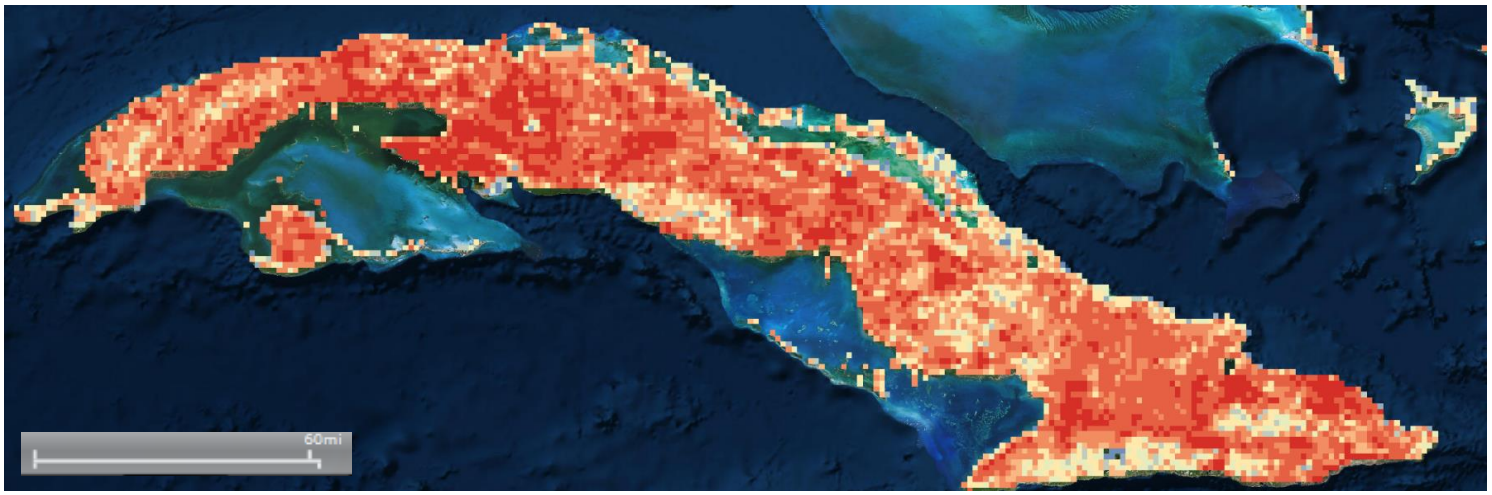
Habitat Suitability: Jamaica



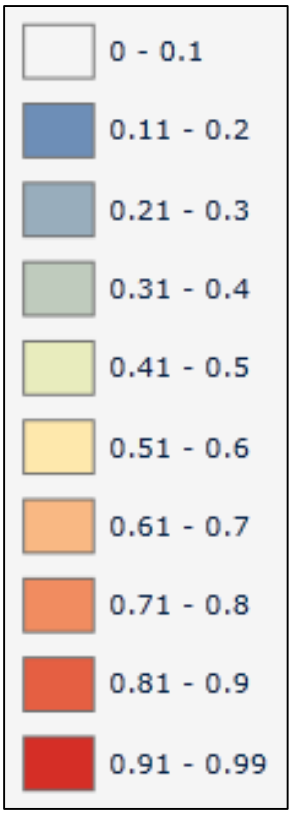
Habitat Suitability: Hispaniola



Habitat Suitability: Puerto Rico



Habitat Suitability: Cuba



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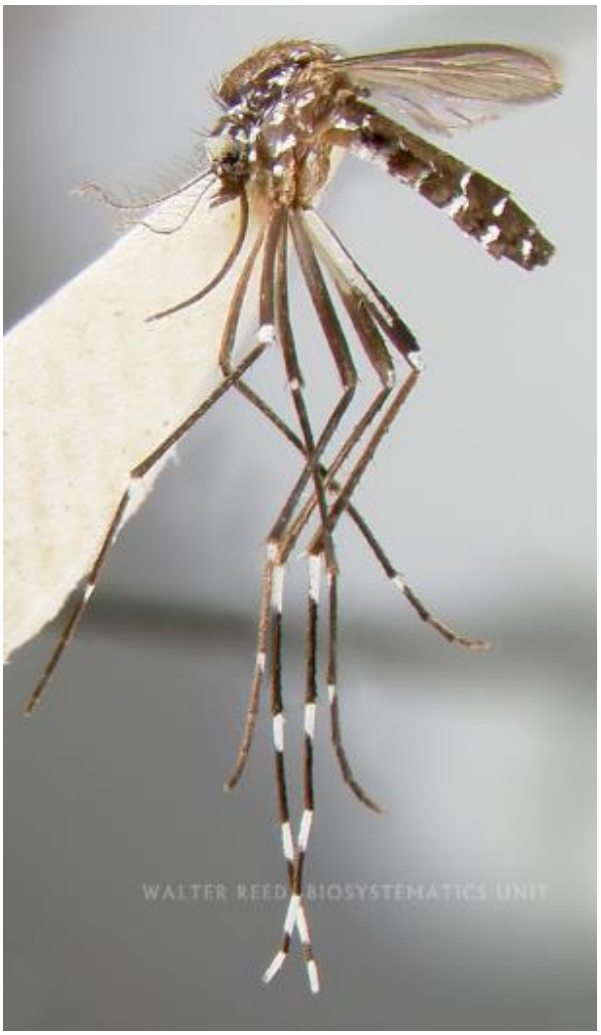
Aedes (Stg.) albopictus (Skuse, 1894)



Bionomics:

Larval *Ae. albopictus* are found in natural containers, including tree holes, bamboo stumps, coconut shells, rock holes, palm fronds, and leaf axils. They are also found in all varieties of artificial containers and will breed indoors. Females readily bite man (Huang, 1972).

Medical Importance:

Vector of dengue and yellow fever in the wild. Under laboratory conditions: bird malarias, Eastern and Western equine encephalitis, West Nile, Zika, Chikungunya and Japanese encephalitis viruses (Huang, 1972).

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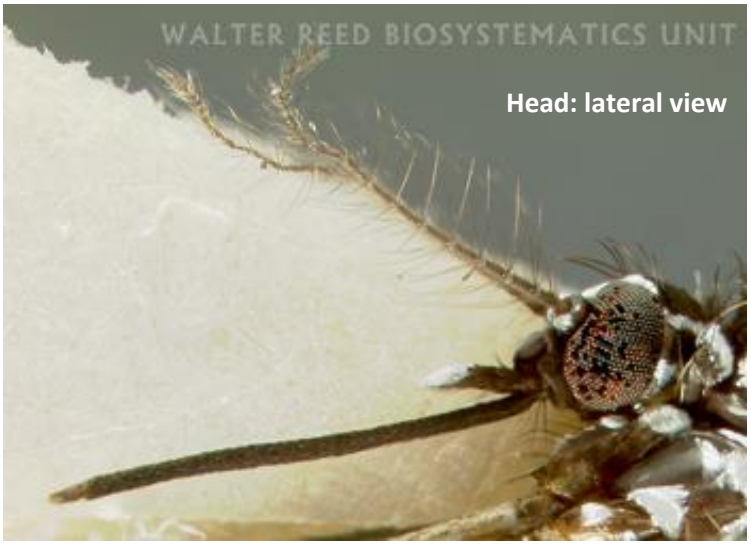

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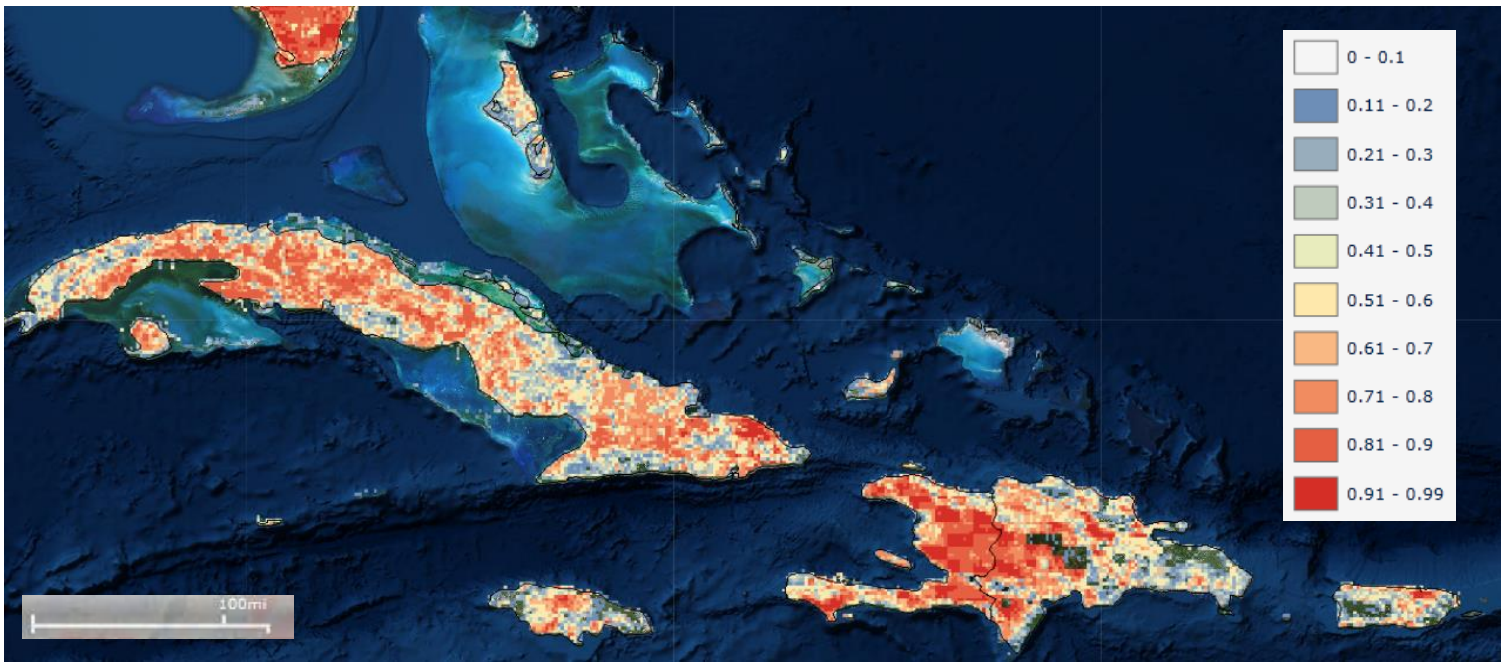
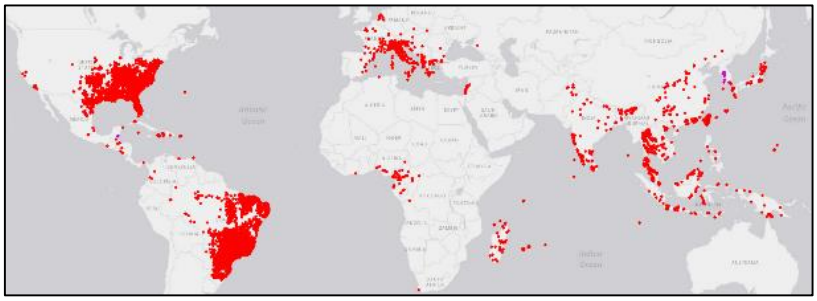
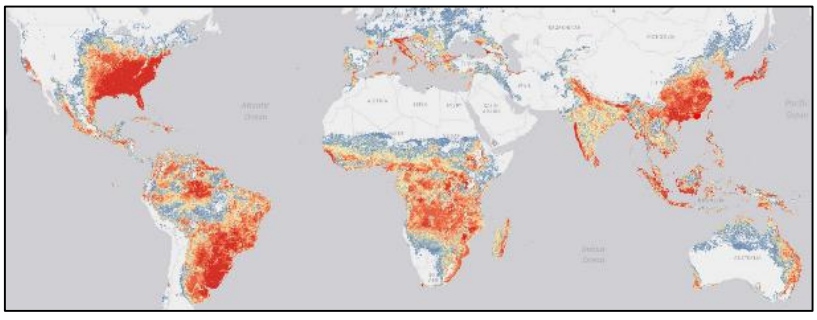
Aedes (*Stg.*) *albopictus* (Skuse, 1894)





VectorMap data points for *Ae. albopictus*
37, 426 records as of October 2017.



Boosted regression tree model of habitat suitability for *Ae. albopictus*, Global. Kraemer et al. 2016.

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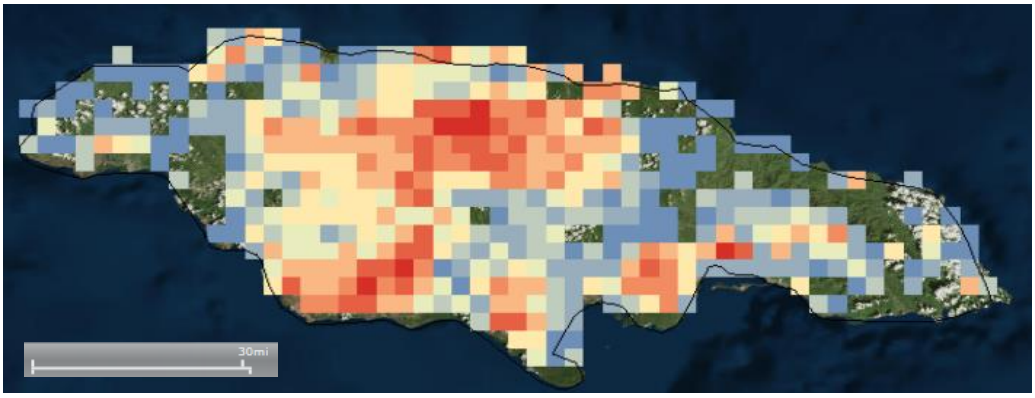
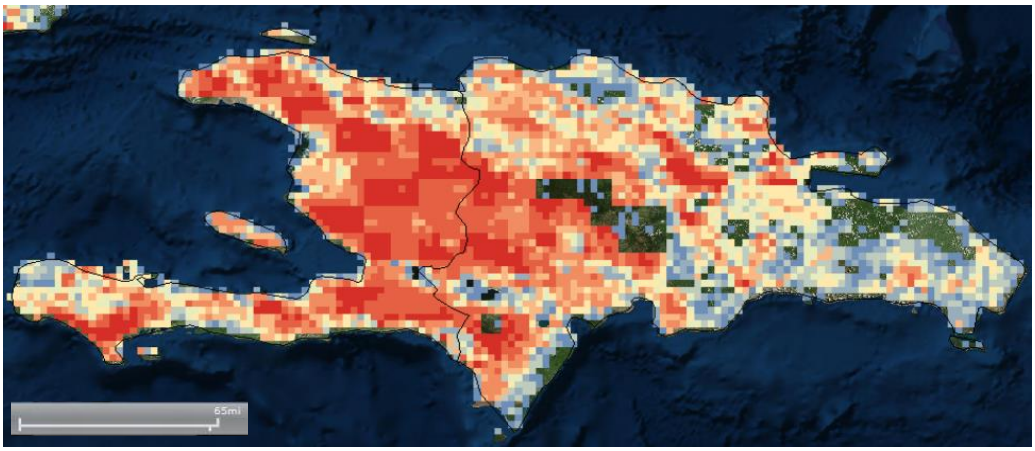
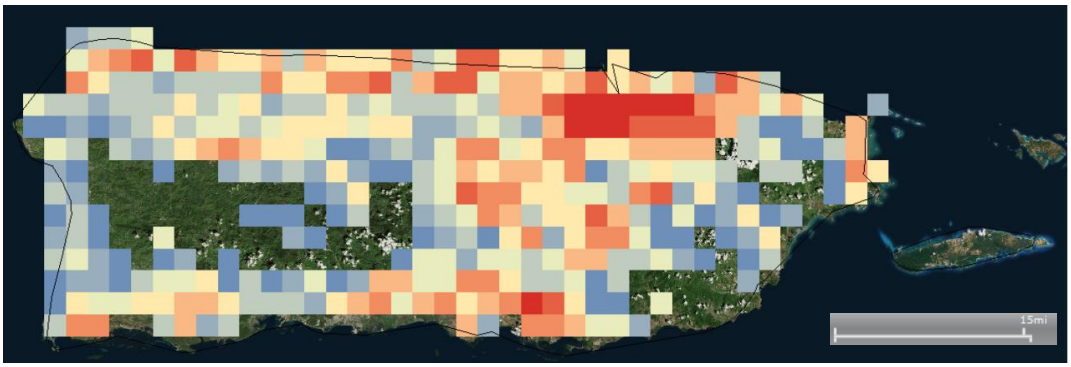
Aedes (Stg.) albopictus (Skuse, 1894)



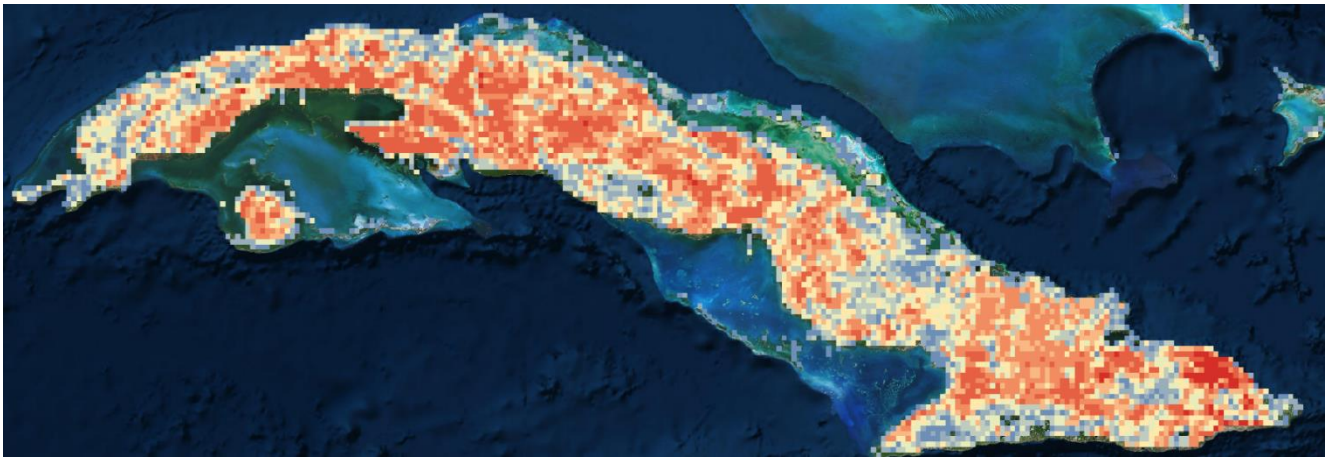
Habitat Suitability: Jamaica



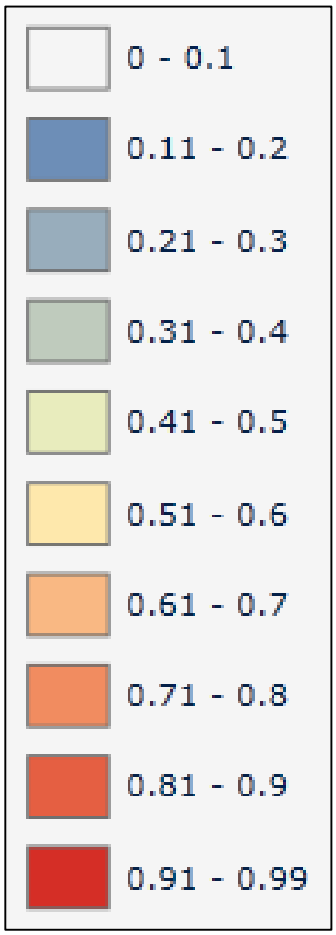
Habitat Suitability: Hispaniola



Habitat Suitability: Puerto Rico



Habitat Suitability: Cuba



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Aedes (*Och.*) *scapularis* (Rondani, 1848)

Bionomics

Aedes scapularis is found at low to moderate elevations throughout most of tropical and subtropical America. It breeds in a wide variety of temporary or semi-permanent freshwater situations, primarily temporary rain-filled or stream overflow pools but including pond and swamp margins, rock holes and crab holes, in either sun or partial shade. Females of scapularis attack man readily, and though primarily crepuscular, will bite anytime they are disturbed (Arnell, 1976).

Medical Importance

At least 15 viruses having been isolated from *Aedes scapularis* including yellow fever and Venezuelan equine encephalitis (VEE) viruses and it also appears to be a vector of Bancroftian filariasis (Arnell, 1976).

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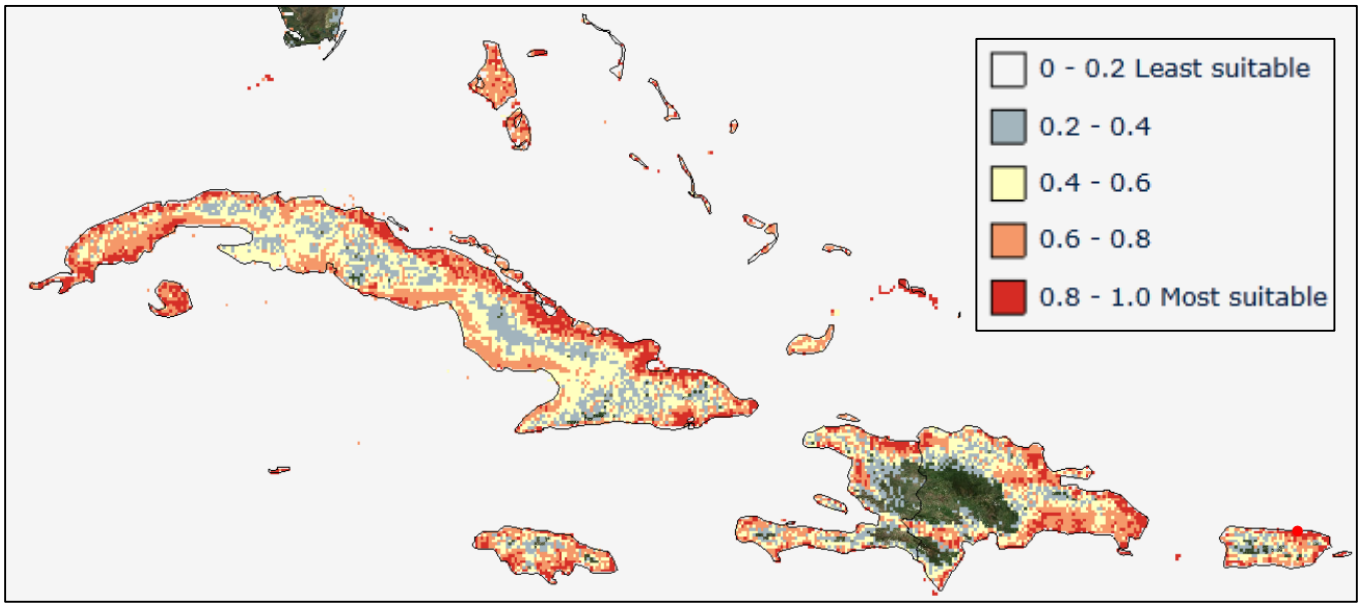
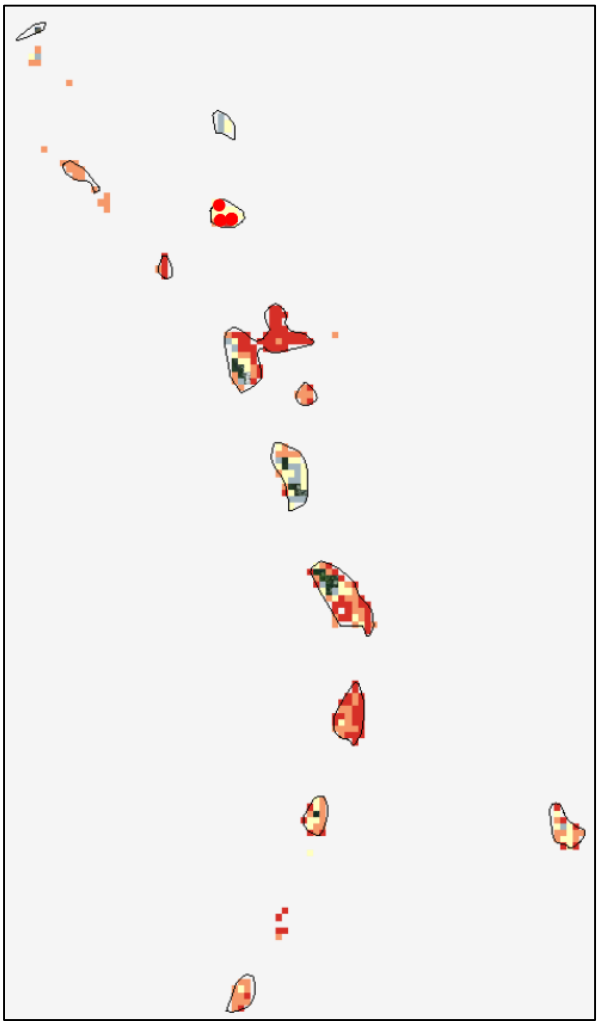
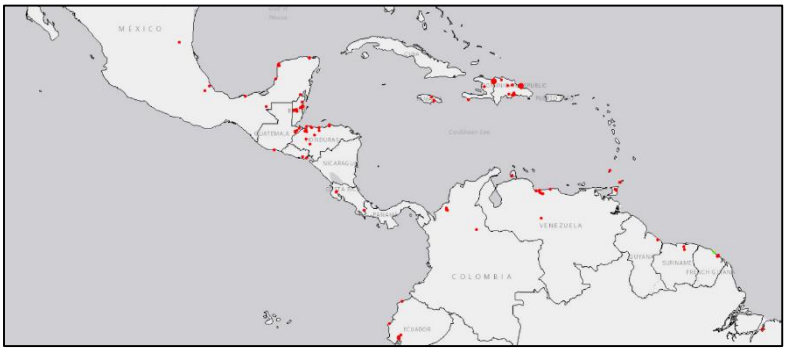
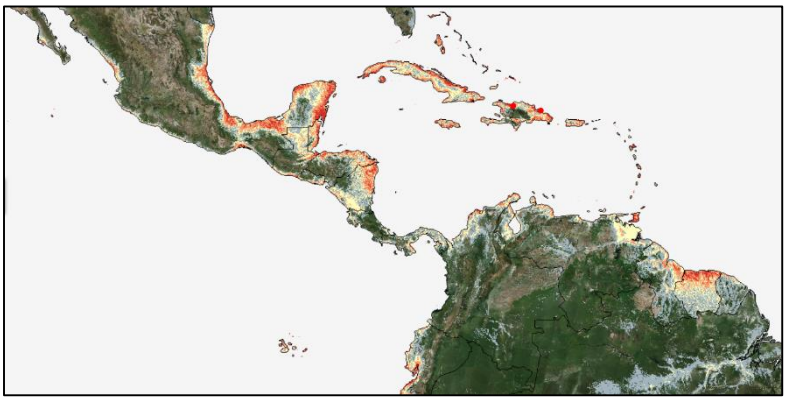
Aedes (*Och.*) *scapularis* (Rondani, 1848)







VectorMap data points for *Ae. scapularis* 635 records accessed October, 2017



Maximum entropy habitat suitability model *Ae. scapularis* Dornak, 2011

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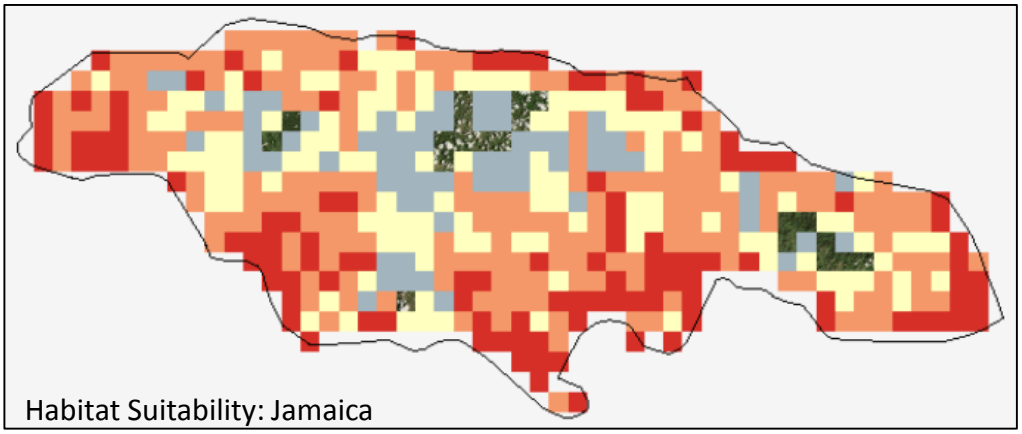
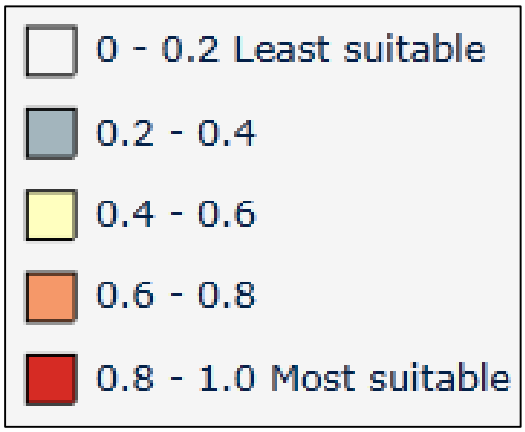
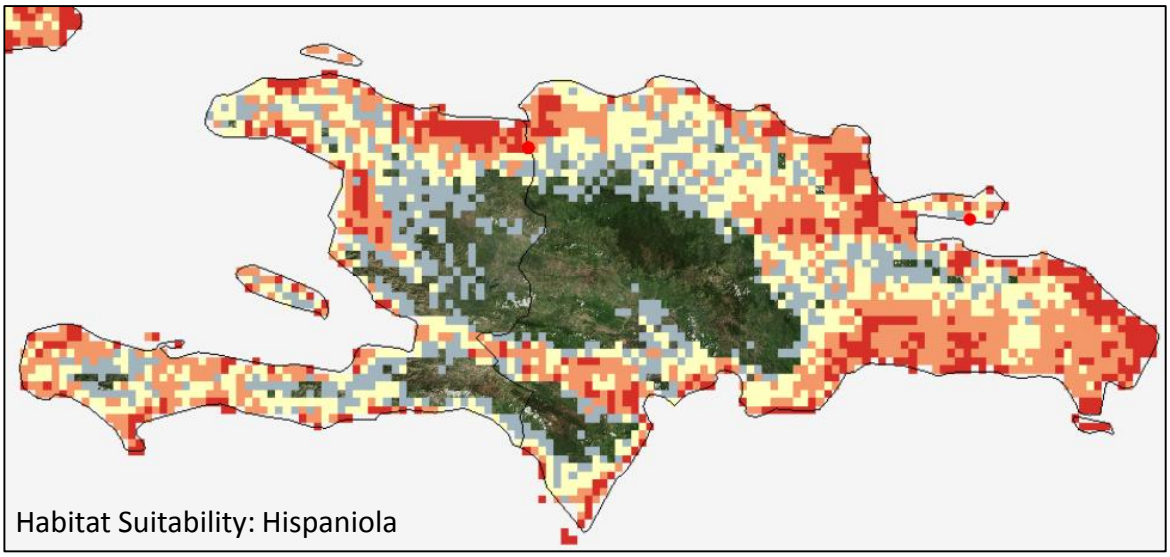
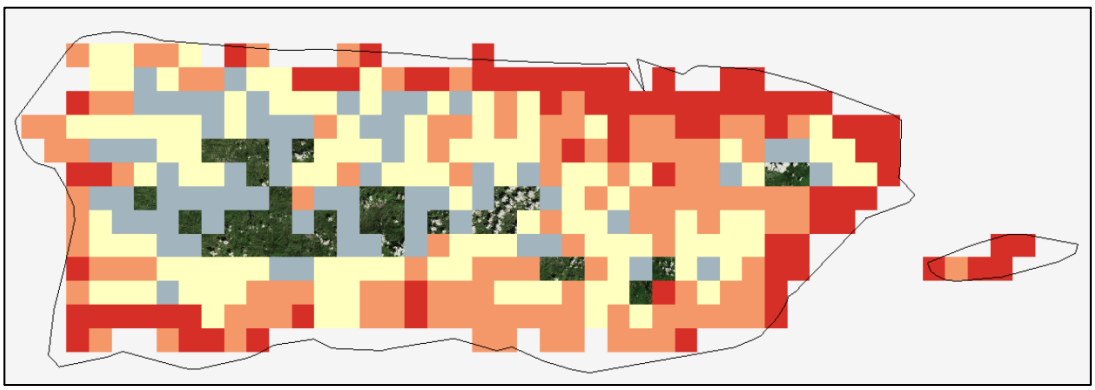
Aedes (*Och.*) *scapularis* (Rondani, 1848)

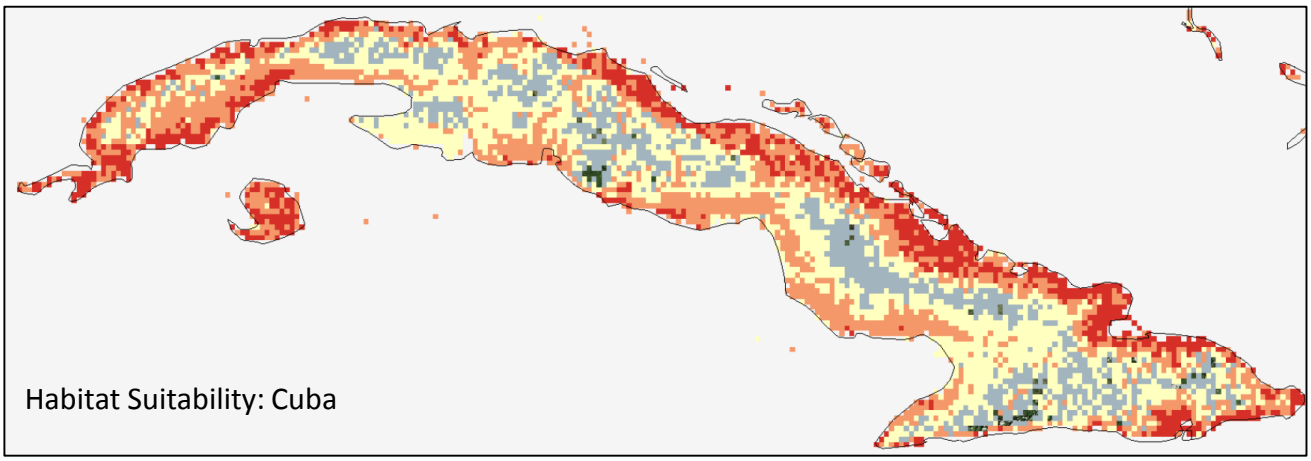








Habitat Suitability: Puerto Rico



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Aedes (*Och.*) *taeniorhynchus* (Wiedemann, 1821)

Bionomics

The larvae of *Aedes taeniorhynchus* develop mostly in salt marshes in coastal areas and occasionally in near-by freshwater pools. They have been found also in inland brackish-water swamps, particularly in oil fields, in areas far removed from the coast. The species reaches its greatest abundance along the coastal Caribbean region. The females are persistent biters and will attack anytime during the day or night. The adults rest in the vegetation during the daytime and will attack anyone invading their haunts, even in bright sunlight. They are strong fliers and often migrate in large numbers to communities where they become serious pests, even many miles from the salt-water marshes. (Carpenter and LaCasse, 1955)

Medical Importance

Ae. taeniorhynchus considered a vector of Eastern equine encephalitis (EEE) (Turell et al. 2005).

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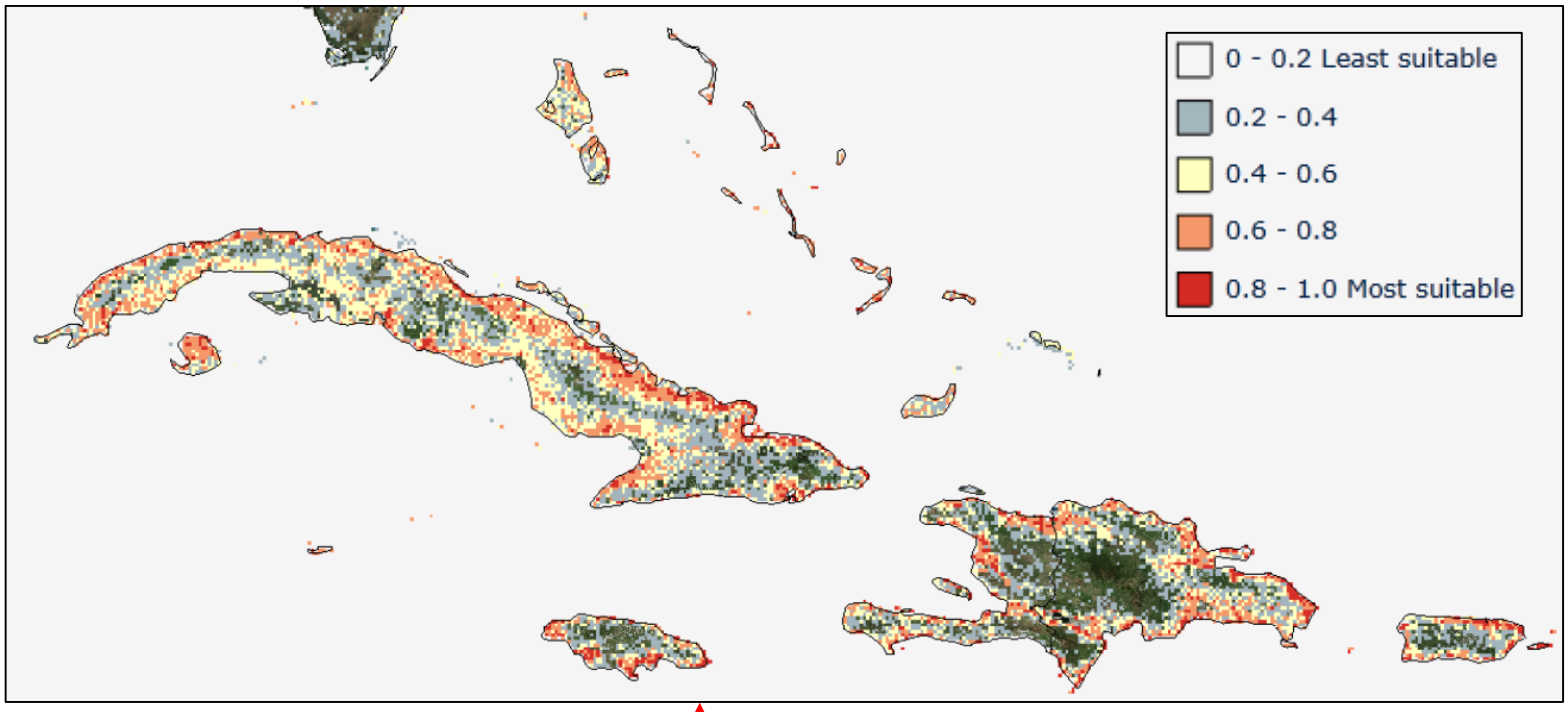
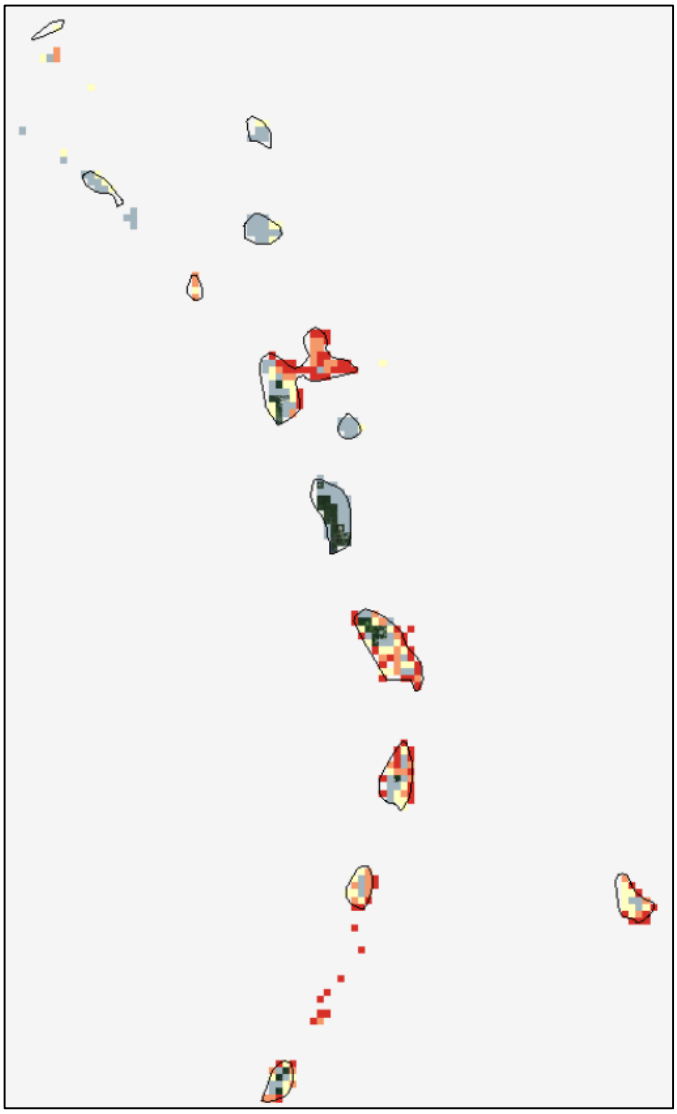
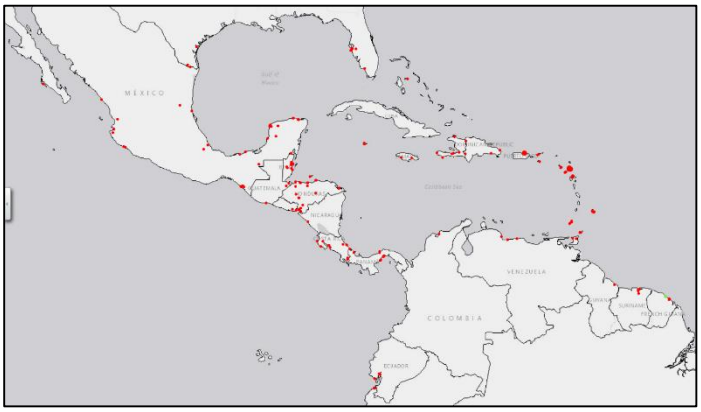
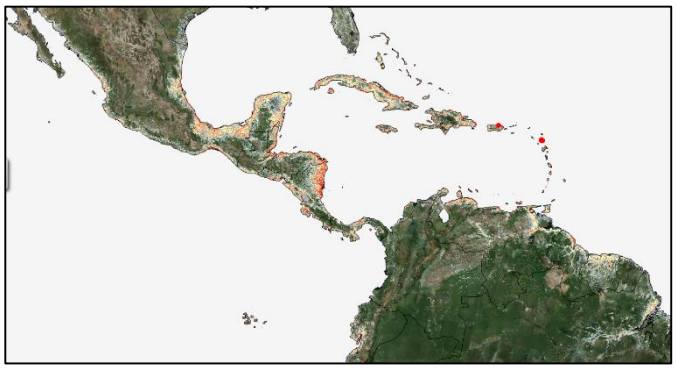
Aedes (Och.) taeniorhynchus (Wiedemann, 1821)







VectorMap data points for *Ae. taeniorhynchus* 2099 records accessed October, 2017



Maximum entropy habitat suitability model *Ae.taeniorhynchus* Dornak, 2011

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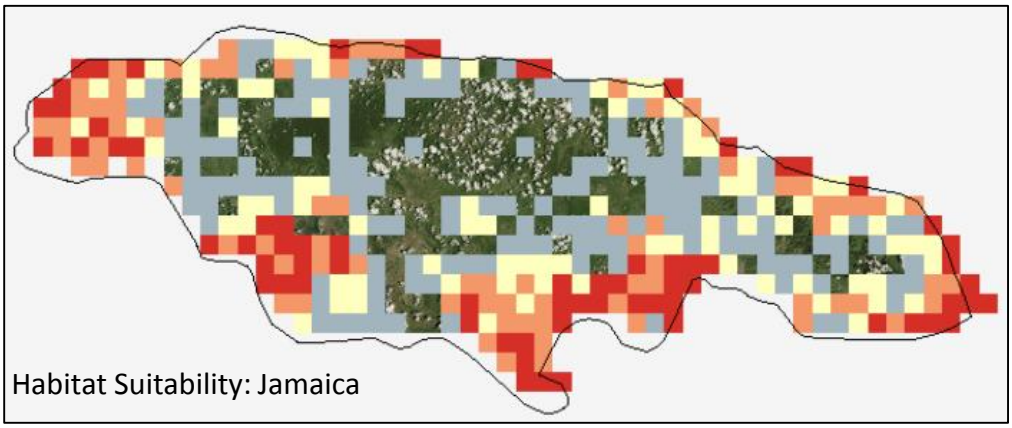
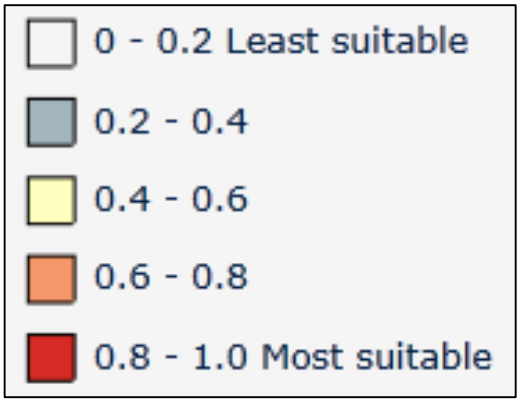
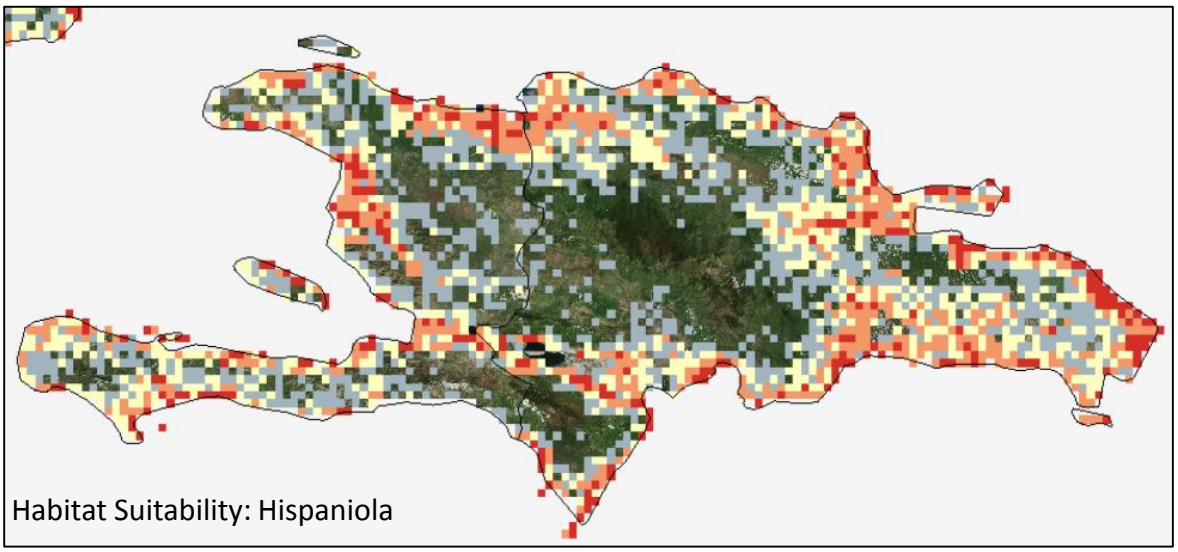
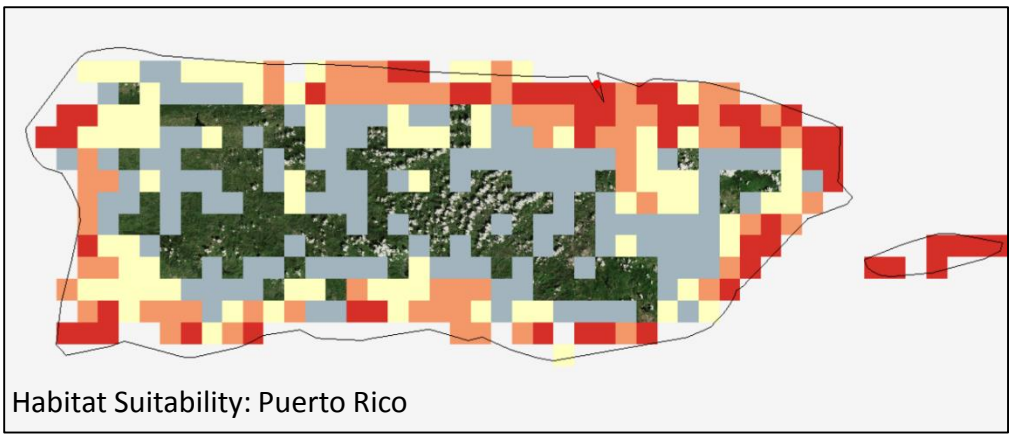
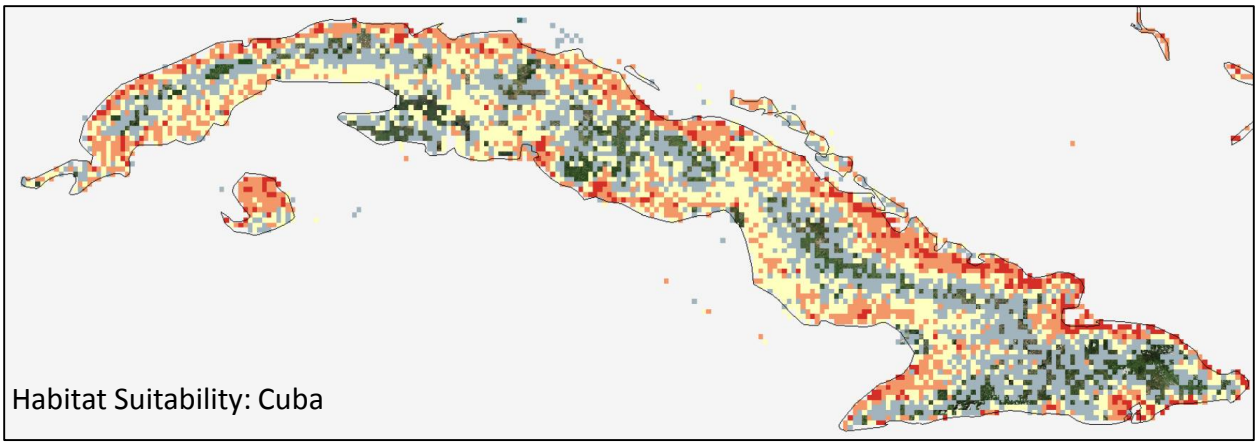
Aedes (Och.) taeniorhynchus (Wiedemann, 1821)











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Aedes (*Gym.*) *mediovittatus* (Coquillett, 1906)

Bionomics

Ae. mediovittatus is primarily found in forested areas of the Caribbean. It can be found in both natural and artificial containers including bamboo. This species can be found in habitats also occupied by Ae. aegypti, but is more likely to be found in less developed, rural areas (Moore, 1983; Cox, 2007 & Little, 2011).

Medical Importance

Ae. medivittatus is a confirmed vector of dengue fever virus (DENV) (Gubler, 1985 and Poole-Smith, 2015).

Distribution

Cayman Islands, Cuba, Dominican Republic, Haiti, Jamaica, Puerto Rico, Venezuela, Virgin Islands

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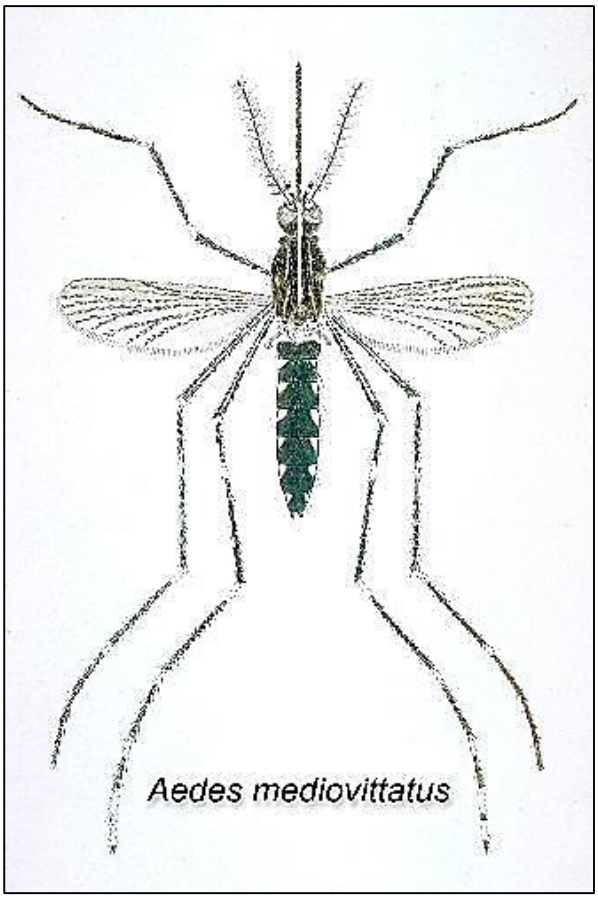

Photo credit: Public Health Image Library, Created by a Working Group at the Centers for Disease Control and Prevention (CDC)

Countries reporting presence of *Ae. mediovittatus* (WRBU Catalog of the Culicidae)

Anopheles (*Nys.*) *albimanus* Wiedemann, 1820

Bionomics

The larvae of *An*. *albimanus* are found in a wide variety of permanent water habitats. They are salt tolerant. Habitats are usually in full sunlight or partial shade containing abundant floating, emergent vegetation and floating scum and algae. Habitats frequently have muddy bottoms and turbid or polluted water.

Medical Importance

In 17 of 20 Caribbean region countries, *An*. *albimanus* is the principal malaria vector.

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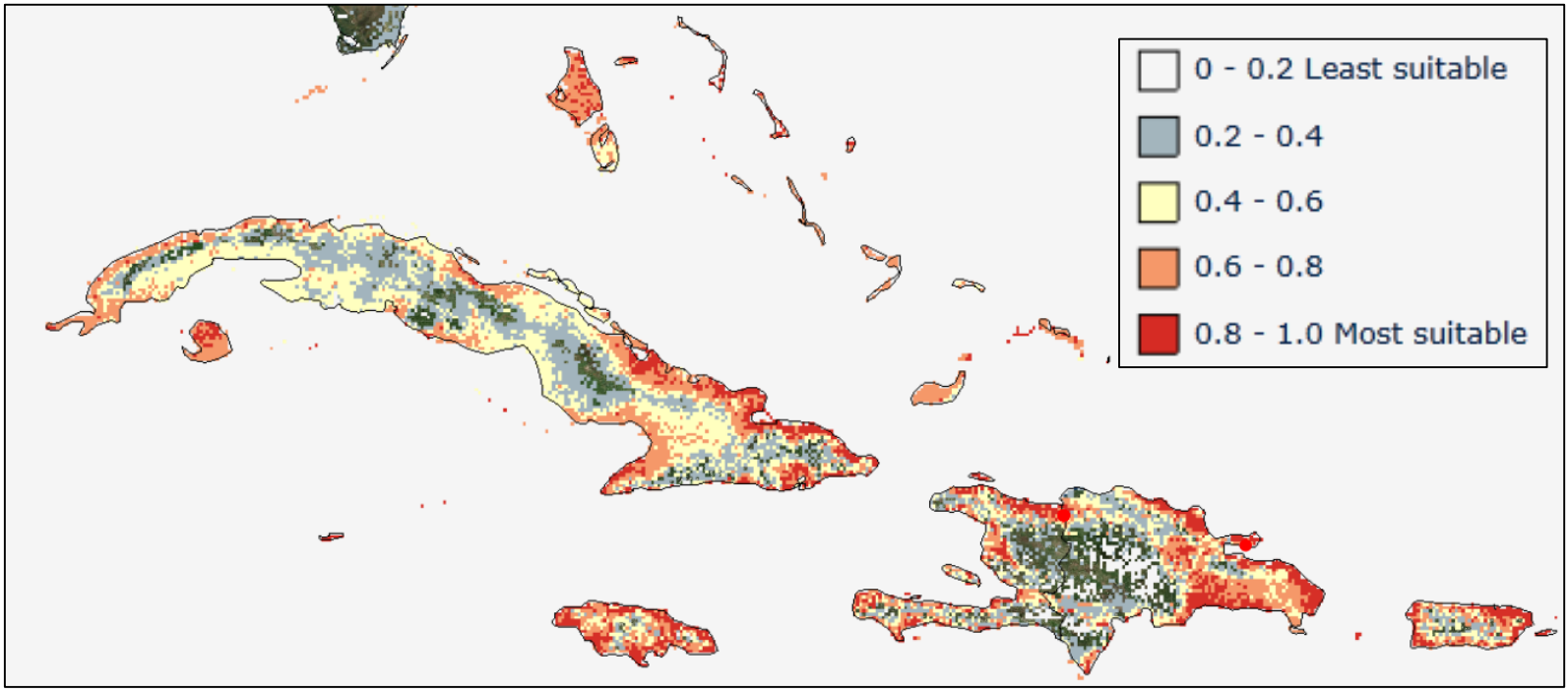
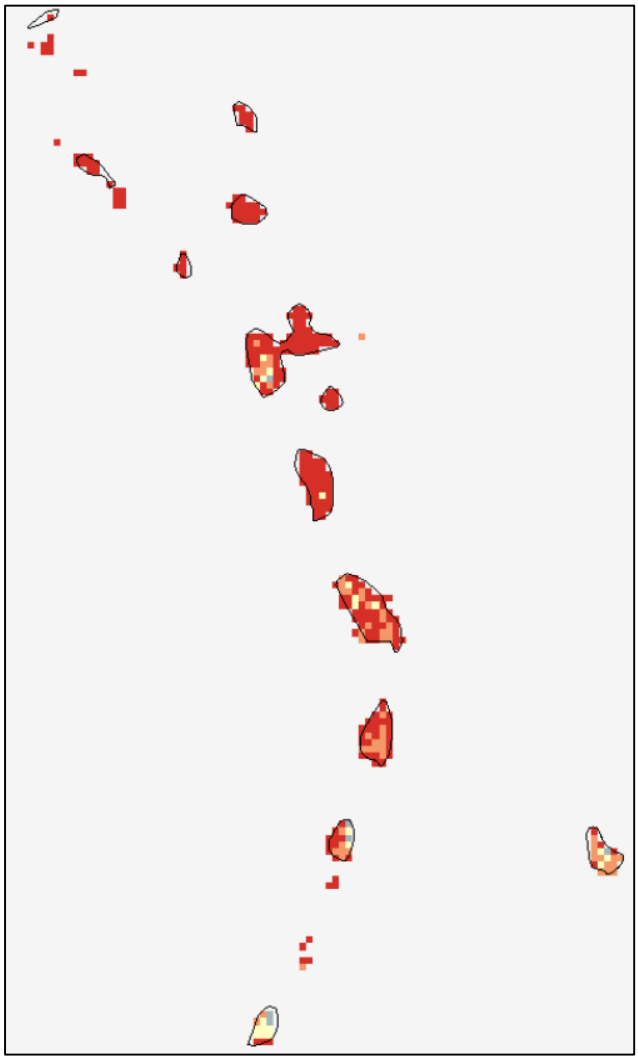
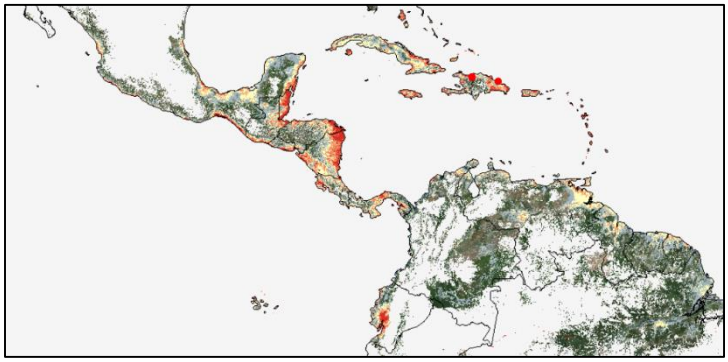
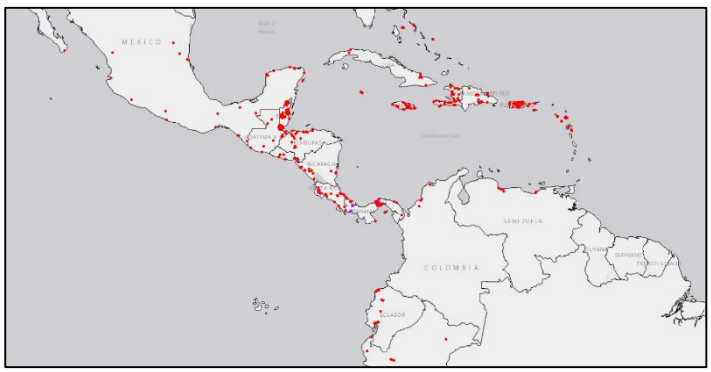
Anopheles (*Nys.*) *albimanus* Wiedemann, 1820







VectorMap data points for *An. albimanus* 1513 records accessed October, 2017



Maximum entropy habitat suitability model *An. albimanus* Nyari, 2011

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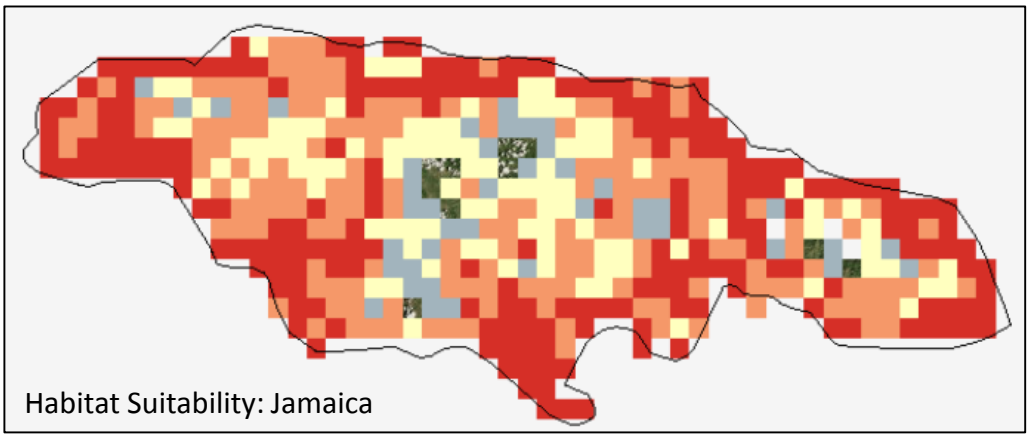
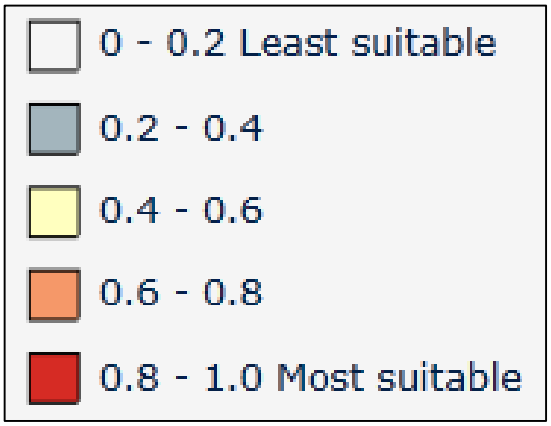
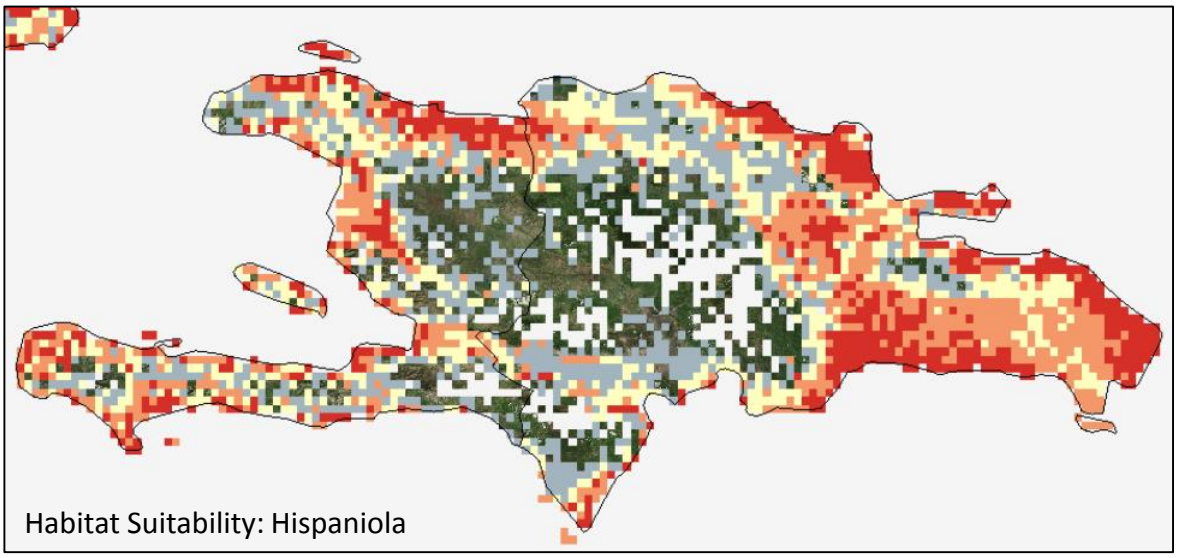
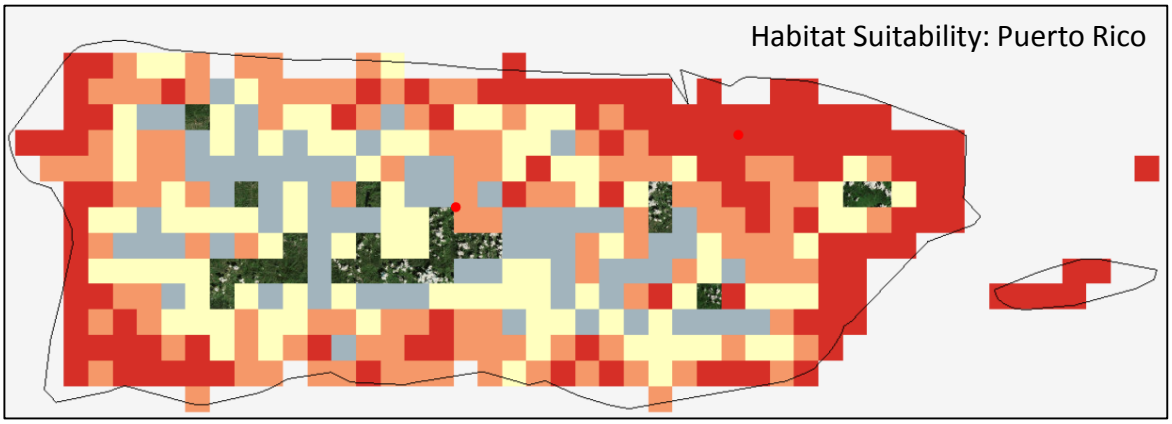
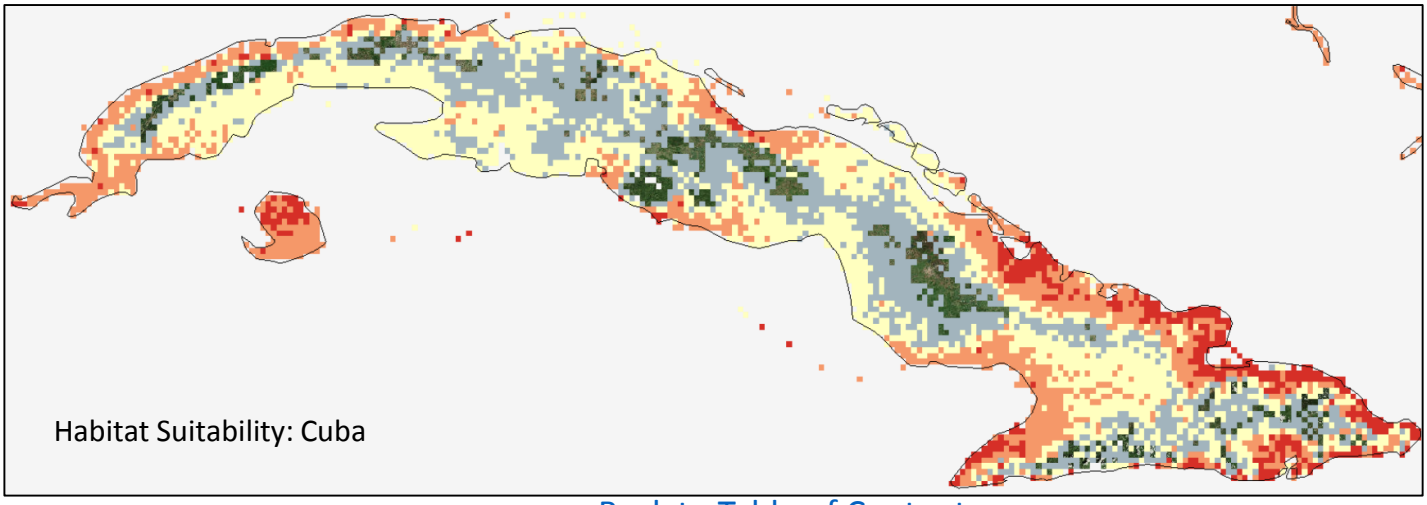
Anopheles (*Nys.*) *albimanus* Wiedemann, 1820











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Anopheles (Nys.) aquasalis Curry, 1932

Bionomics

An. aquasalis is the only species primarily restricted to the coast. This species preferentially occurs in brackish water such as in mangrove swamps and coastal ground pools. However, *An. aquasalis* is capable of living in fresh water and often is collected several kilometers from the coast. (Faran and Linthicum, 1981)

Medical Importance

An. aquasalis is a primary vector of malaria in the Lesser Antilles. Adults feed readily on humans and are commonly collected in houses. (Faran and Linthicum, 1981)

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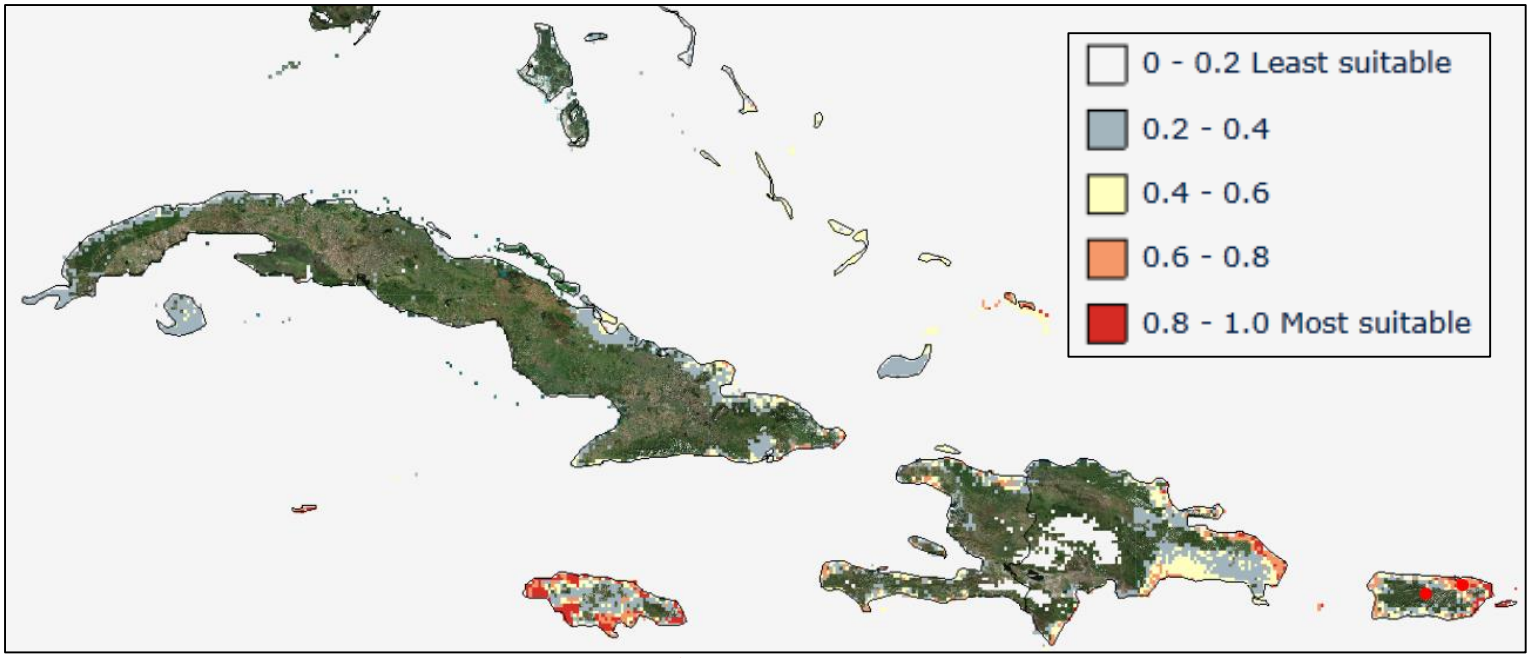
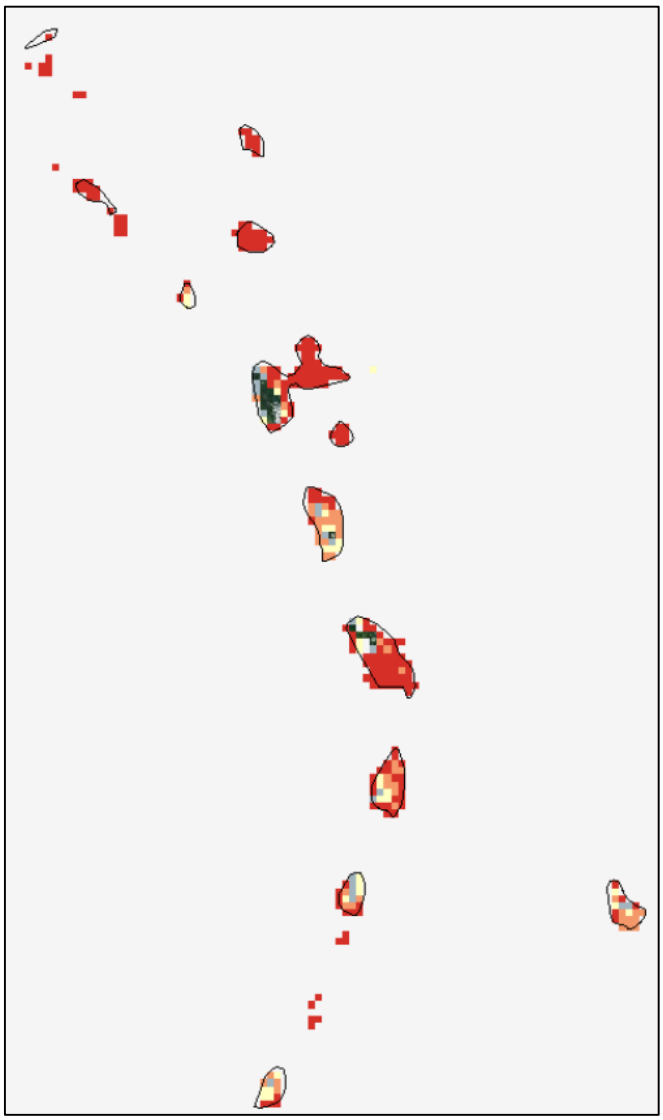
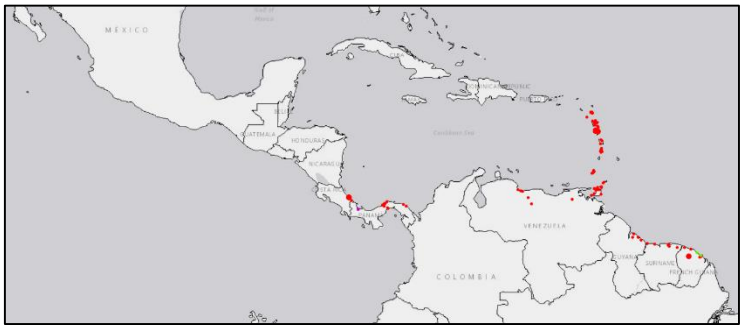
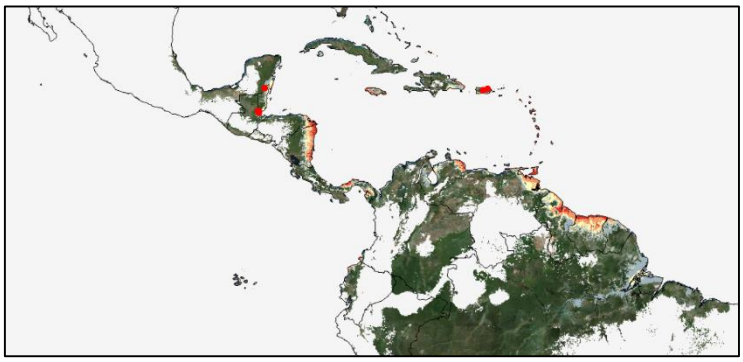
Anopheles (*Nys.*) *aquasalis* Curry, 1932







VectorMap data points for *An. aquasalis* 344 records accessed October, 2017



Maximum entropy habitat suitability model *An. aquasalis* Nyari, 2011

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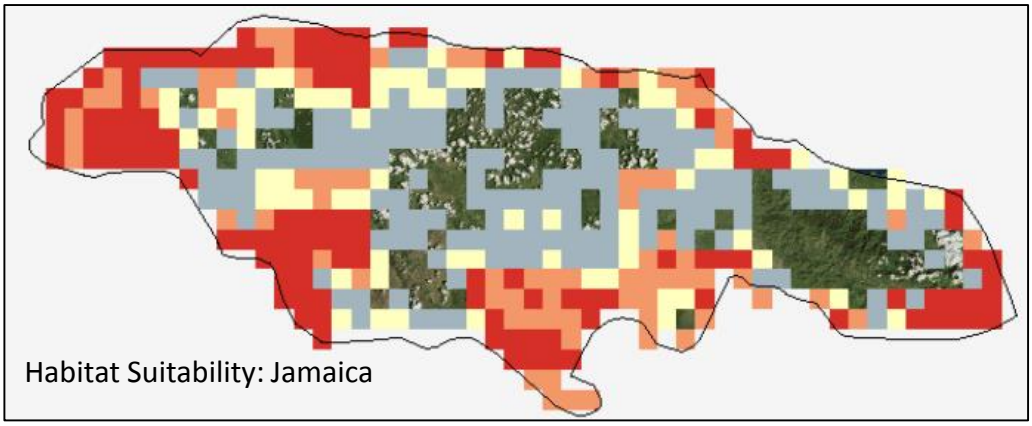
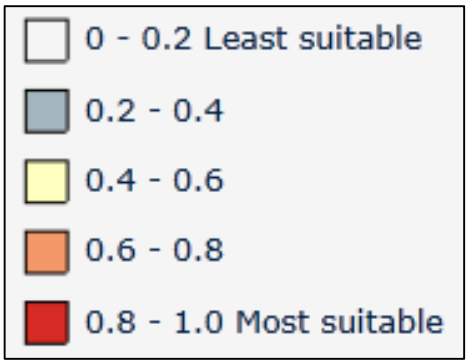
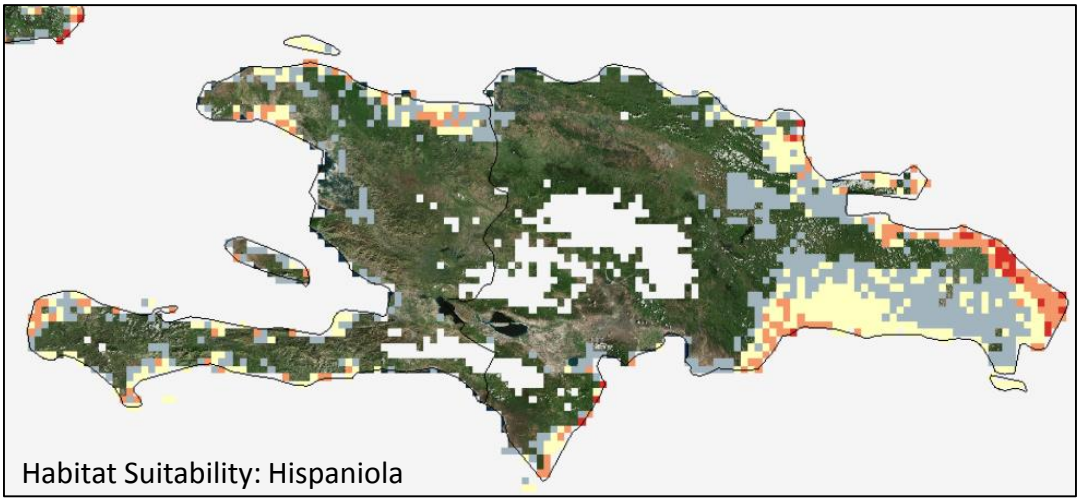
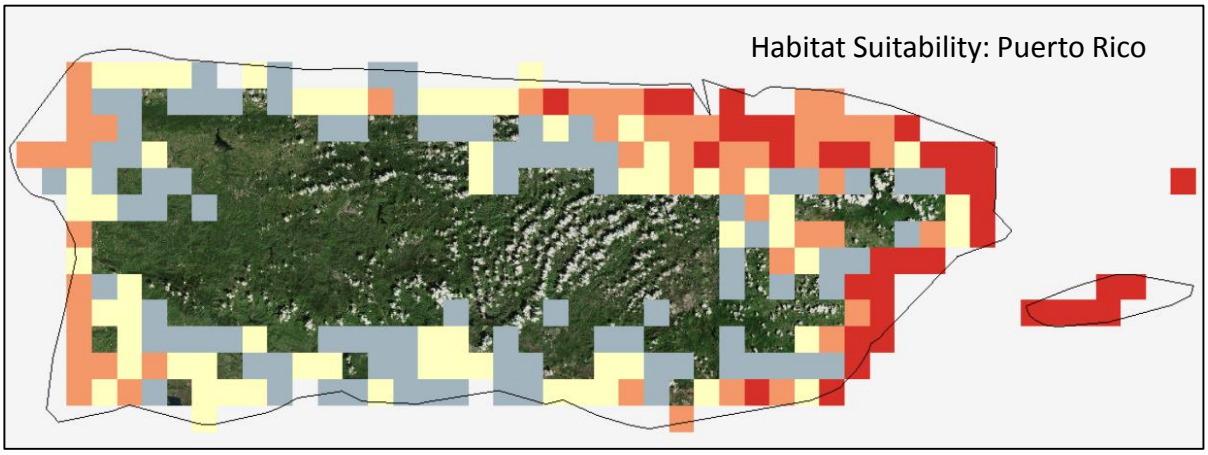
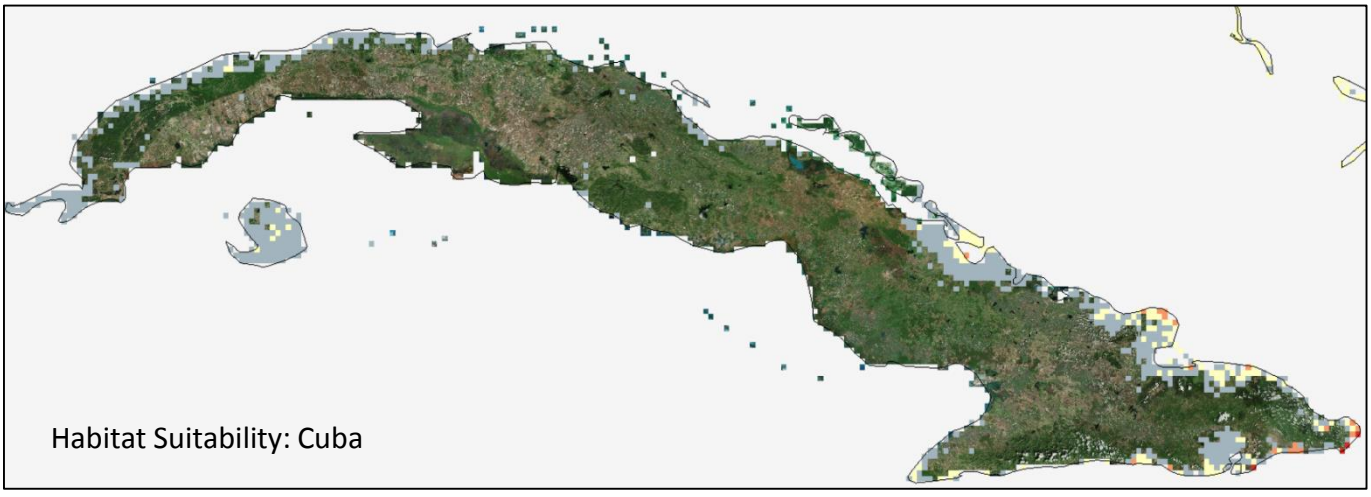
Anopheles (*Nys.*) *aquasalis* Curry, 1932











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Anopheles (*Ano.*) *quadrimaculatus* Say, 1824

Bionomics

Larvae of *An. quadrimaculatus* are found in permanent fresh water habitats which contain floating and/or emergent vegetation. Females readily bite humans, domestic and wild animals, and are most active just after dusk.

Medical Importance

This species is an excellent vector of human malaria. It is also considered a possible vector of dog heartworm (*Dirofilaria immitis*). NOTE: Recent DNA analysis of this species indicates at least four sibling species are present under this name.

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Anopheles (*Nys.*) *argyritarsis* Robineau-Desvoidy, 1827

Bionomics:

Anopheles argyritarsis occurs in ground pools and also occasionally in artificial containers such as tin cans and animal water troughs. The immature habitats are characterized by having some grassy vegetation and are usually in areas of secondary growth. (Linthicum, 1988)

Medical Importance:

An. argyritarsis is generally considered not to be a primary vector of malaria but may be important when it occurs at high densities. Although it is rarely found inside houses and rarely attacks humans, *An. argyritarsis* has been found naturally infected with malaria parasites. (Faran and Linthicum, 1981)

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Anopheles (*Ano.*) *crucians* Wiedemann, 1828

Bionomics:

The larvae are found in semipermanent and permanent pools, pond, lakes and swamps. Acidic water with emergent and floating vegetation is preferred. Females are outdoor night biters but will bite during the cloudy day and in the shade. Both sexes are attracted to lights.

Medical Importance:

This species has been found to be naturally infected with malaria. Infection rates of 3.28% have been observed. This species may serve as an important malaria vector.

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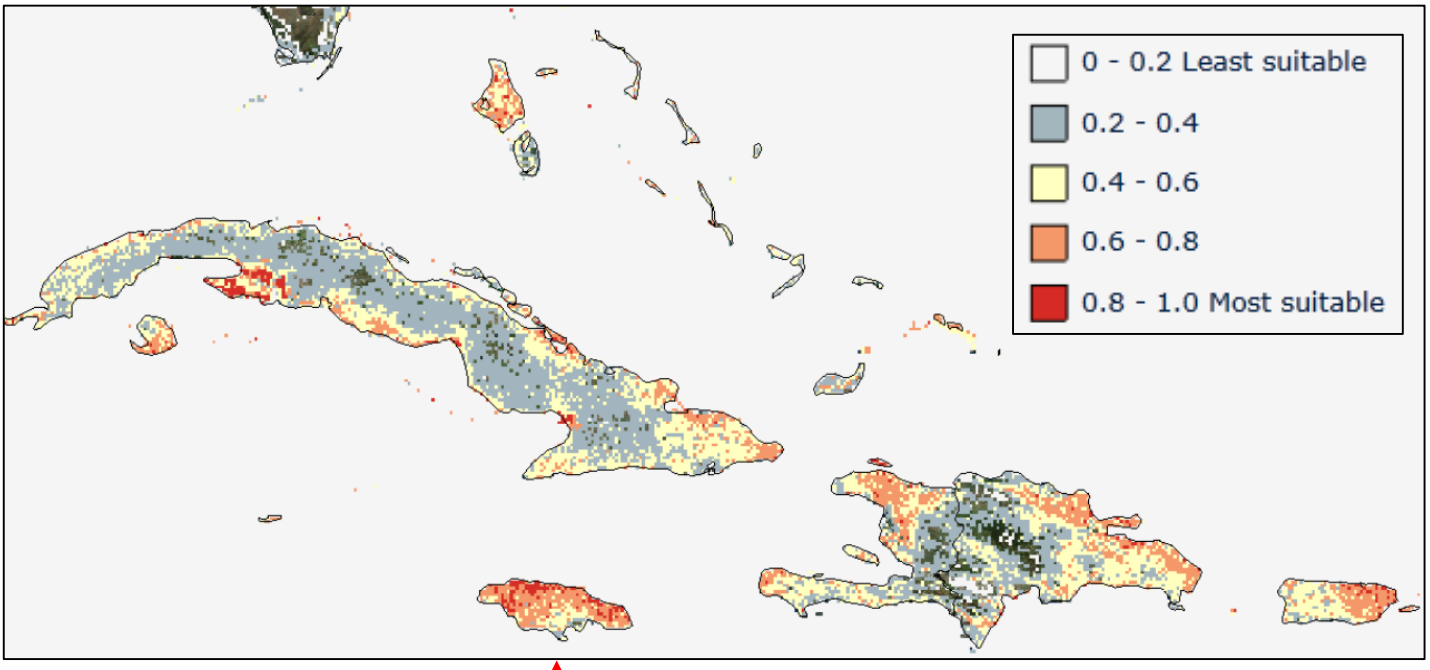
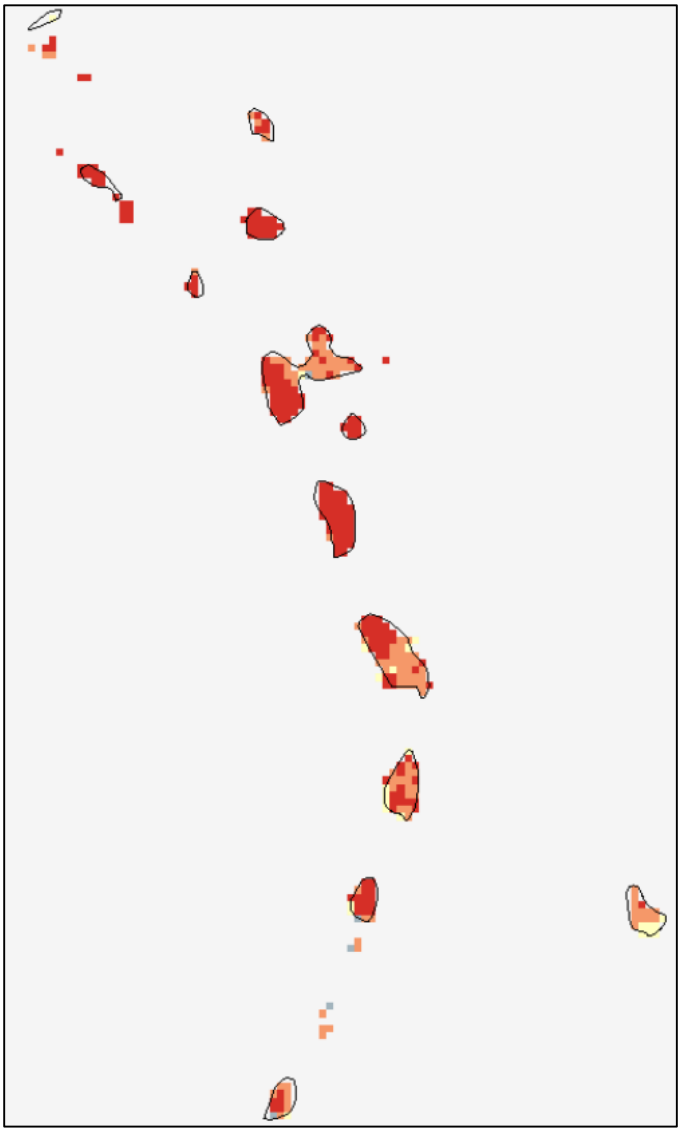
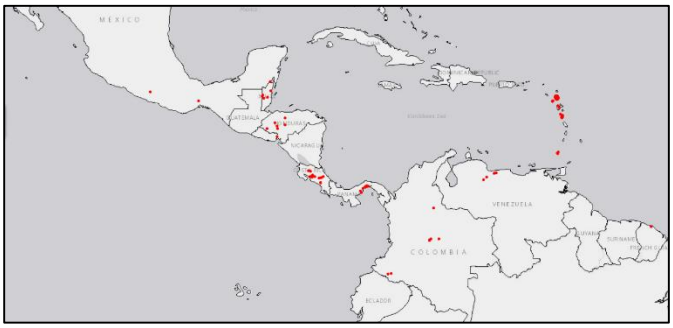
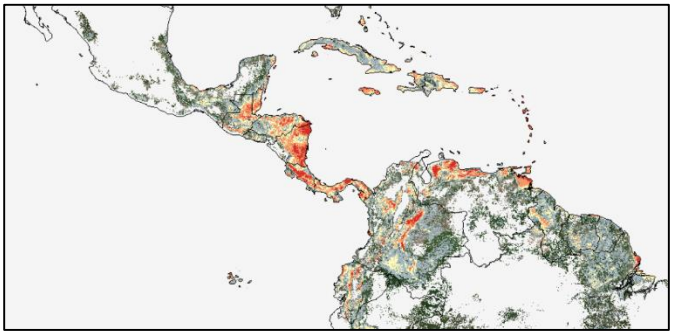
Anopheles (*Nys.*) *argyritarsis* Robineau-Desvoidy, 1827







VectorMap data points for *An. argyritarsis* 818 records accessed October, 2017



Maximum entropy habitat suitability model *An. aquasalis* Nyari, 2011

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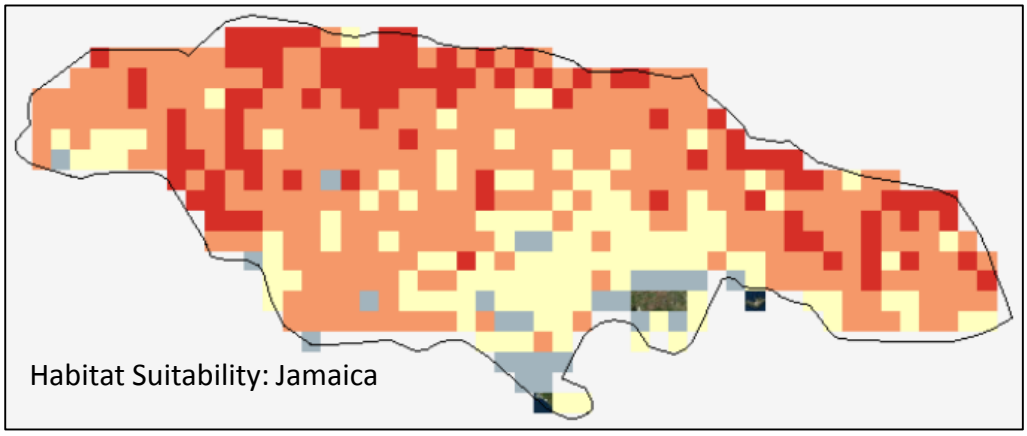
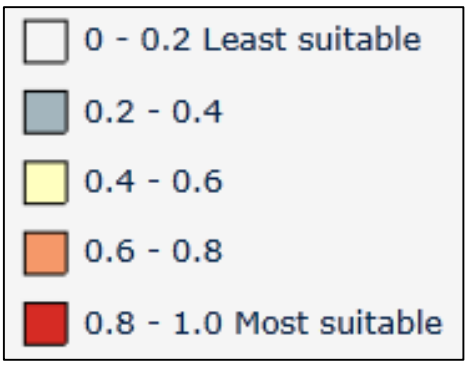
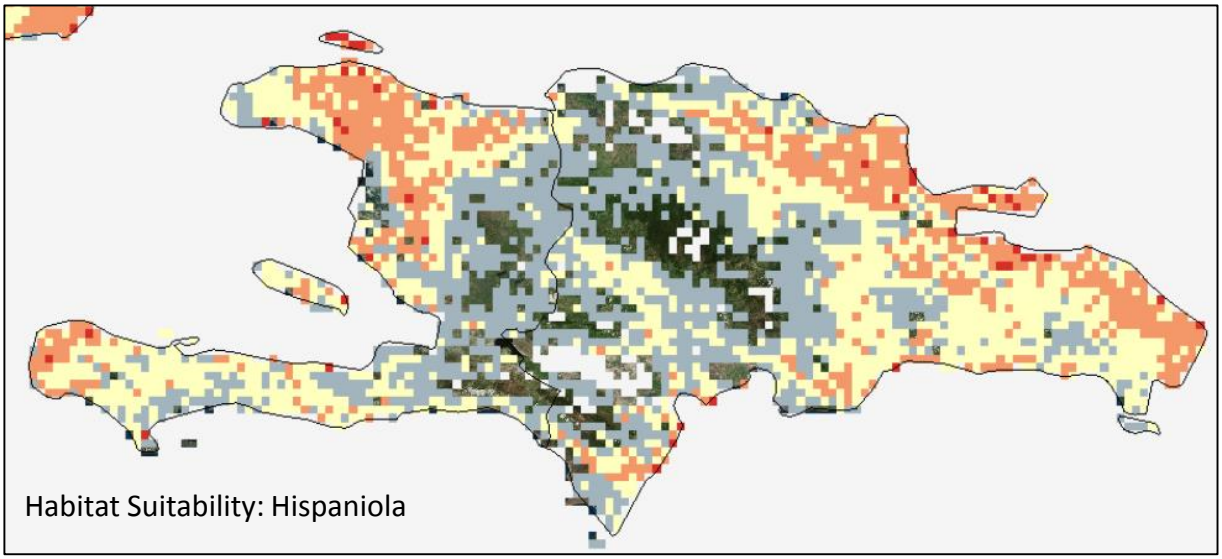
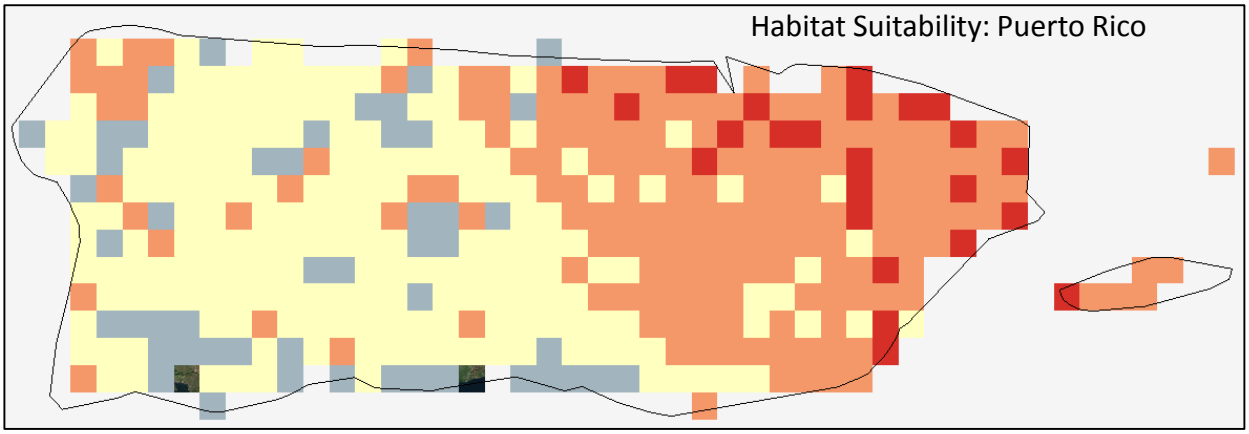
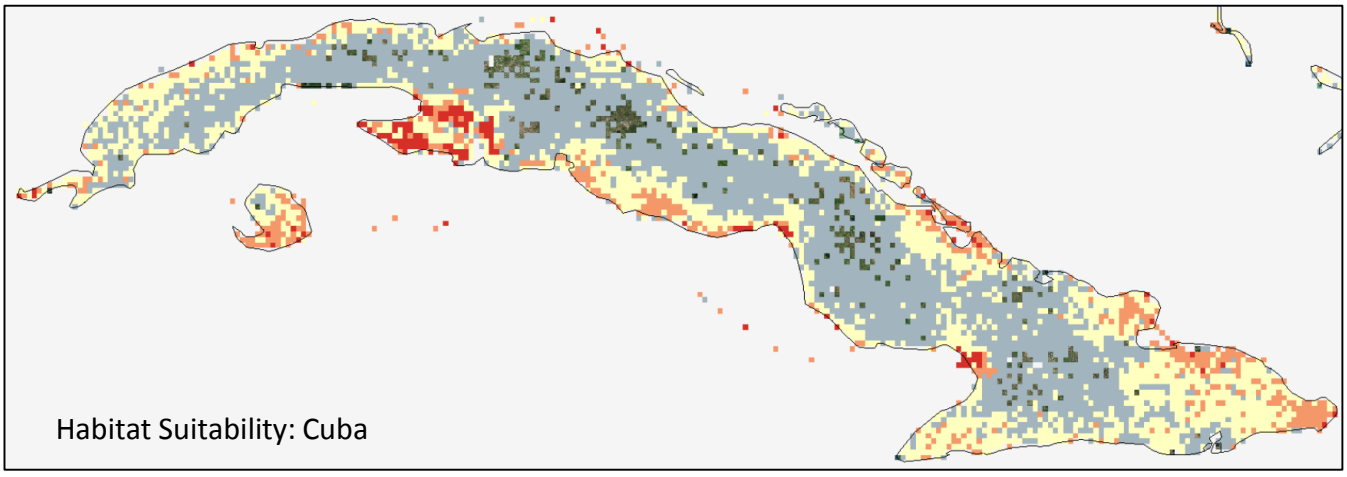
Anopheles (*Nys.*) *argyritarsis* Robineau-Desvoidy, 1827











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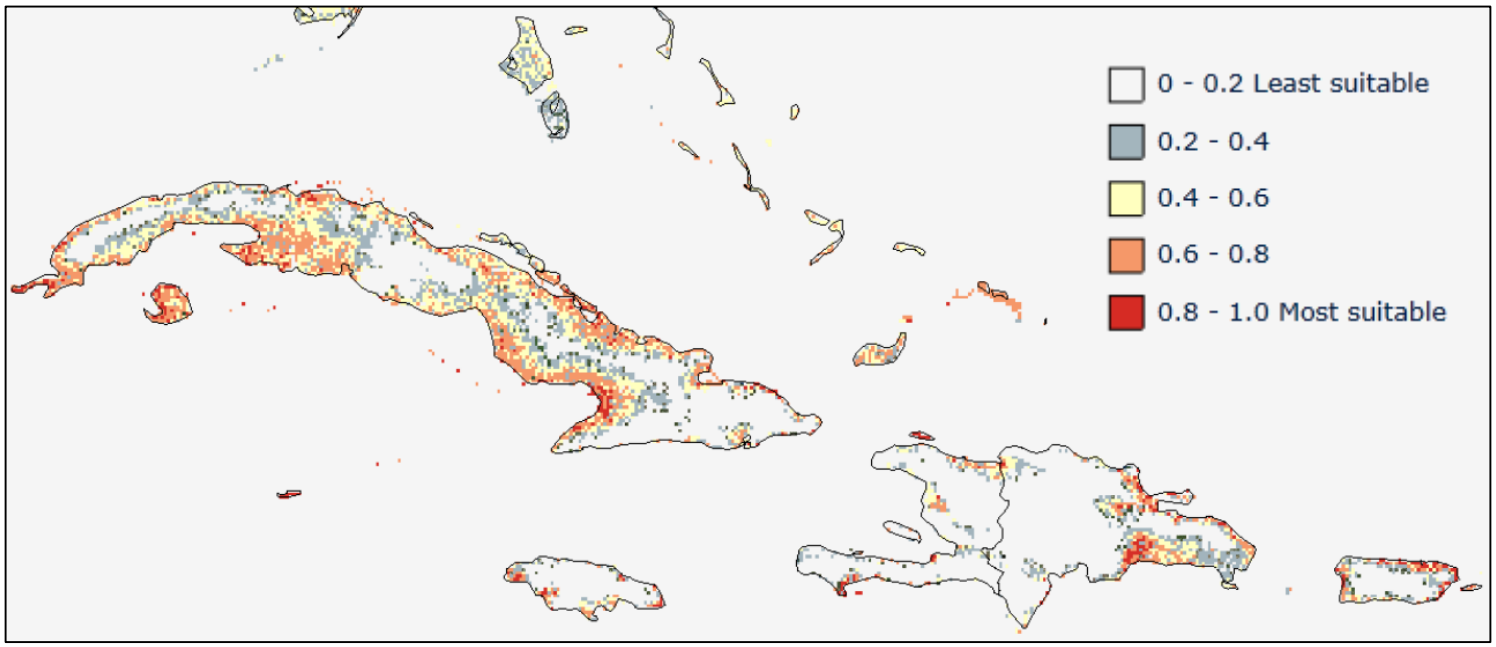
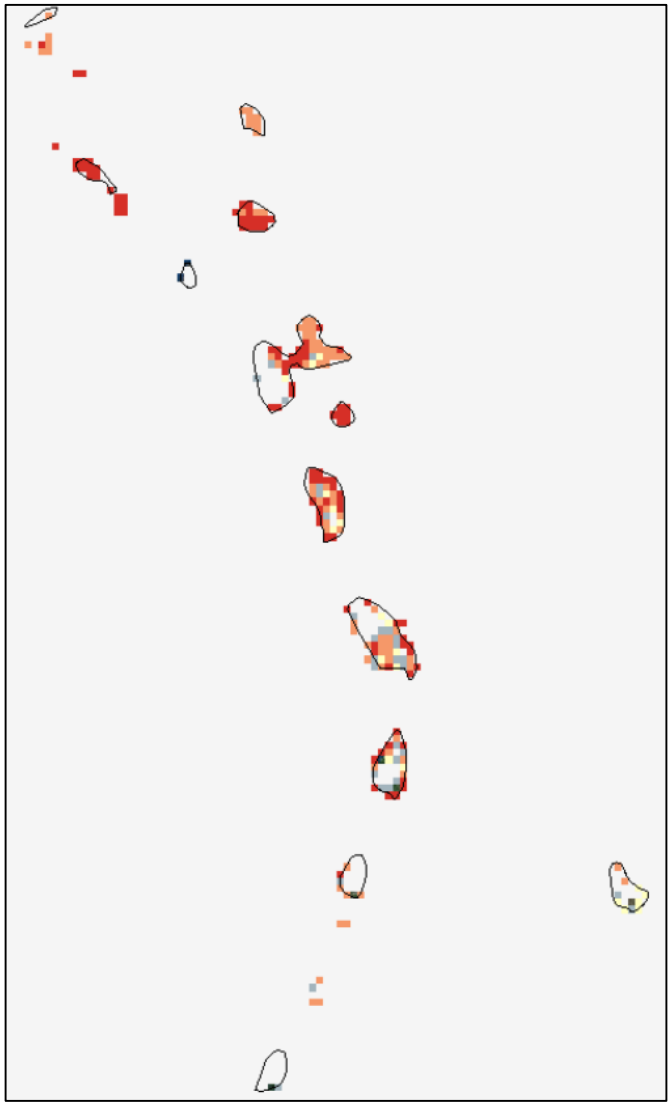
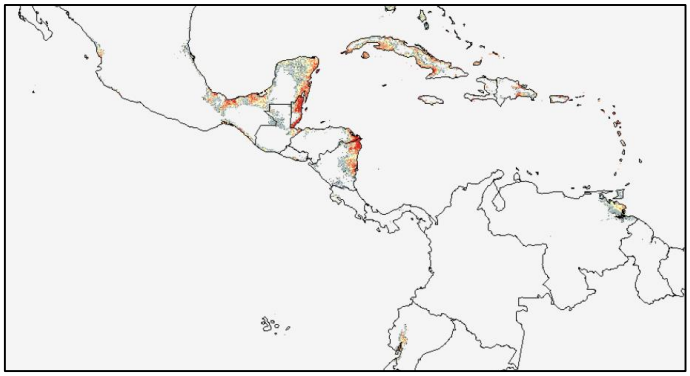
Anopheles (*Ano.*) *crucians* Wiedemann, 1828





VectorMap data points for *An. crucians* 528 records accessed October, 2017



Maximum entropy habitat suitability model *An. crucians* Nyari, 2011

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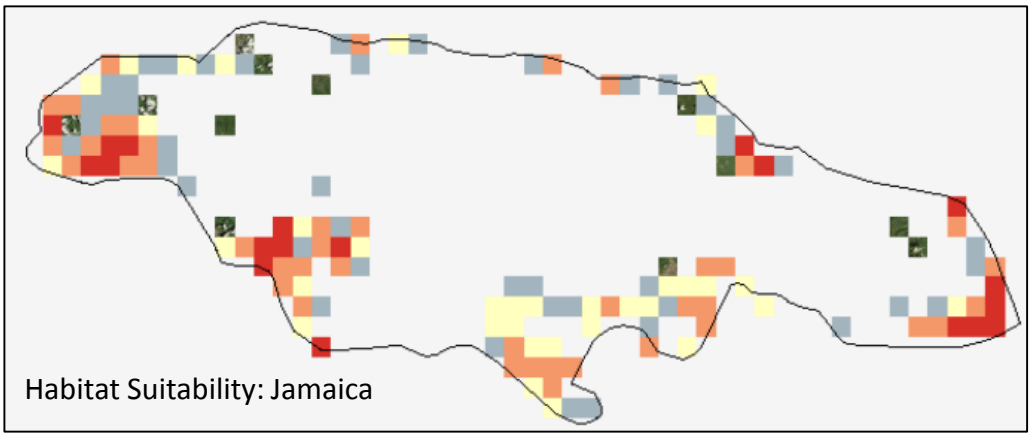
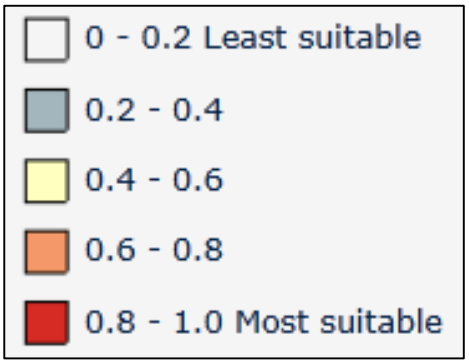
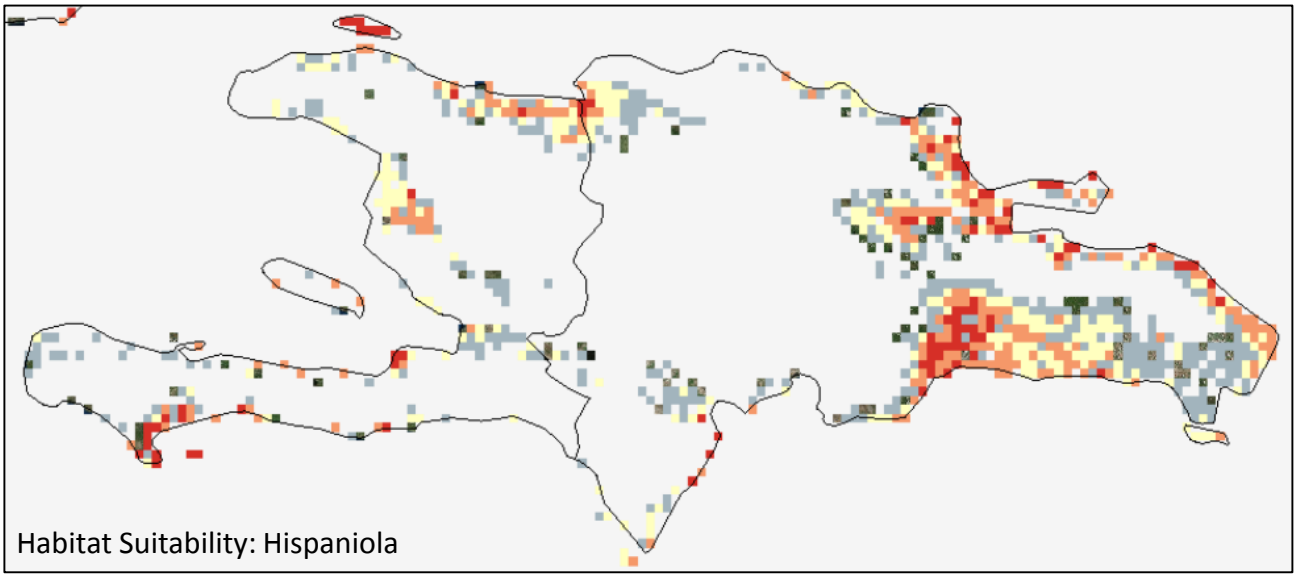
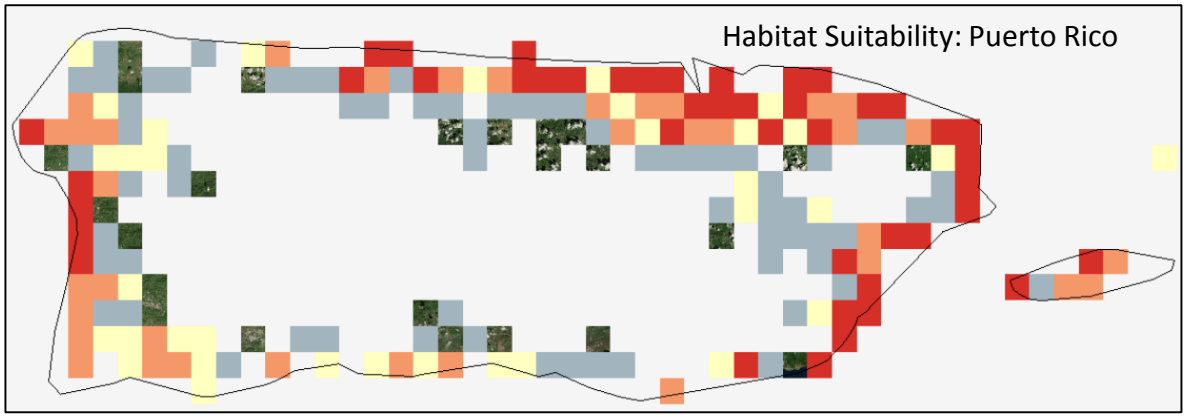
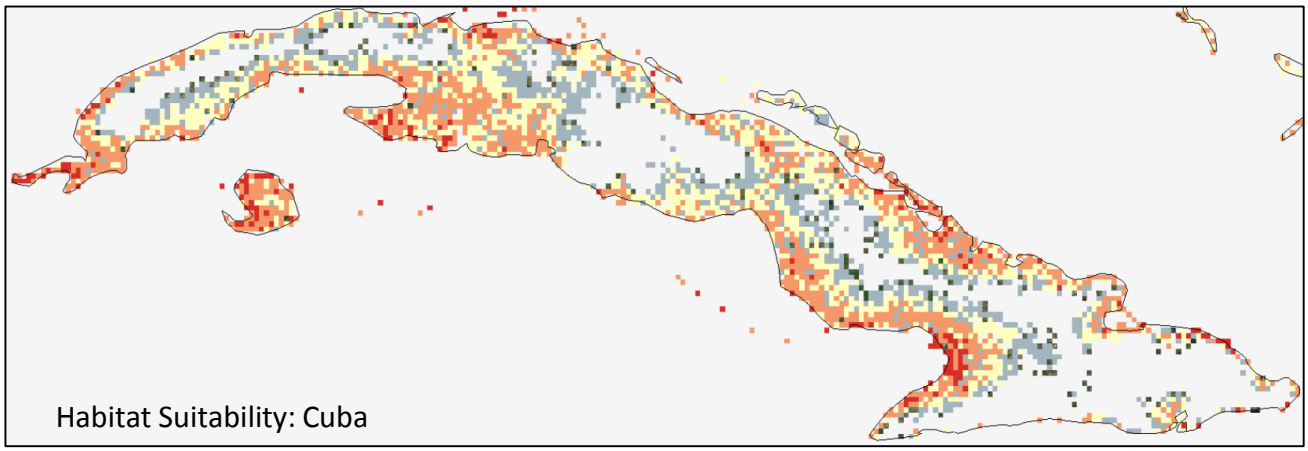
Anopheles (*Ano.*) *crucians* Wiedemann, 1828











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Culex (*Cux.*) *nigripalpus* Theobald, 1901

Bionomics:

The larvae of *Cx. nigripalpus* are found in ditches, grassy pools, and marshes of a semi-permanent or permanent nature. They are occasionally found in water in wheel ruts, leaf axils of plants, and artificial containers. *Culex nigripalpus* is a common man-biting species and is also attracted to CDC traps and animal baited (donkey, chicken) traps. (Belkin et al. 1970)

Medical Importance:

Cx. nigripalpus is considered a vector of Eastern equine encephalitis (EEE), St. Louis encephalitis (SLE) and West Nile Virus WNV (Turell et al. 2005)

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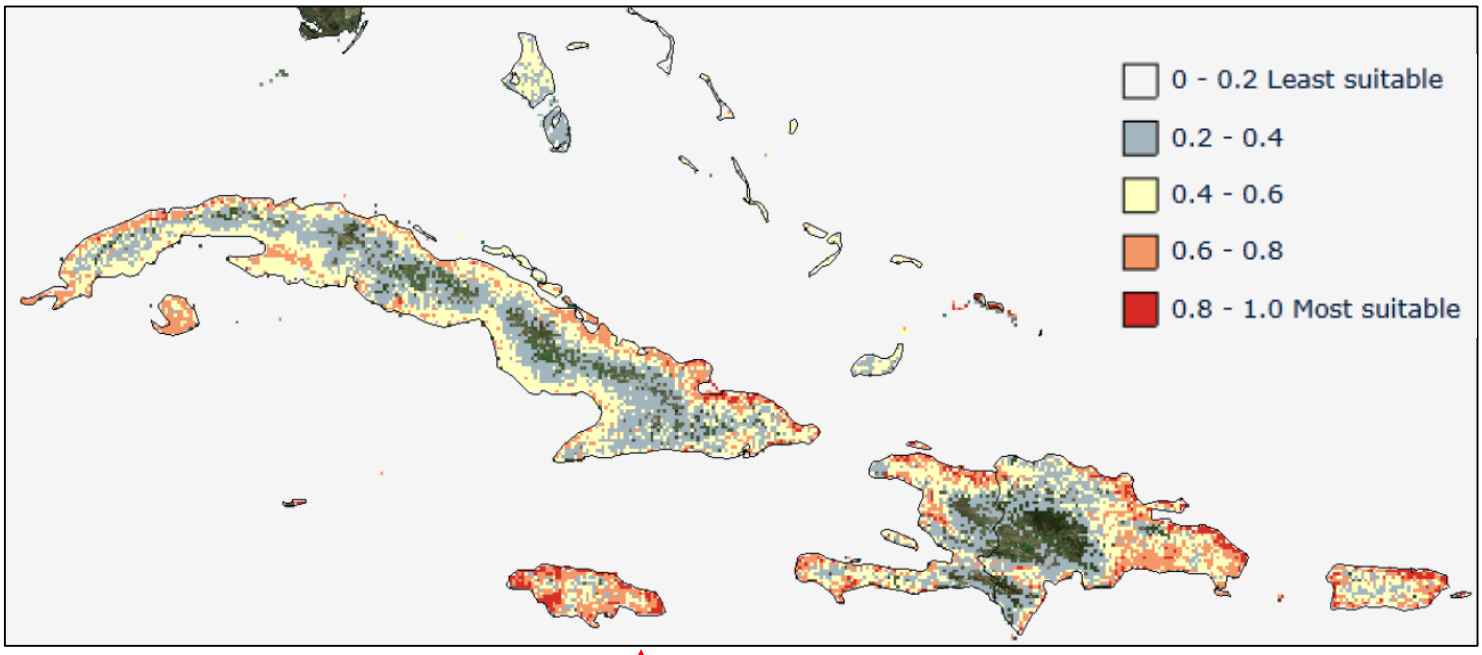
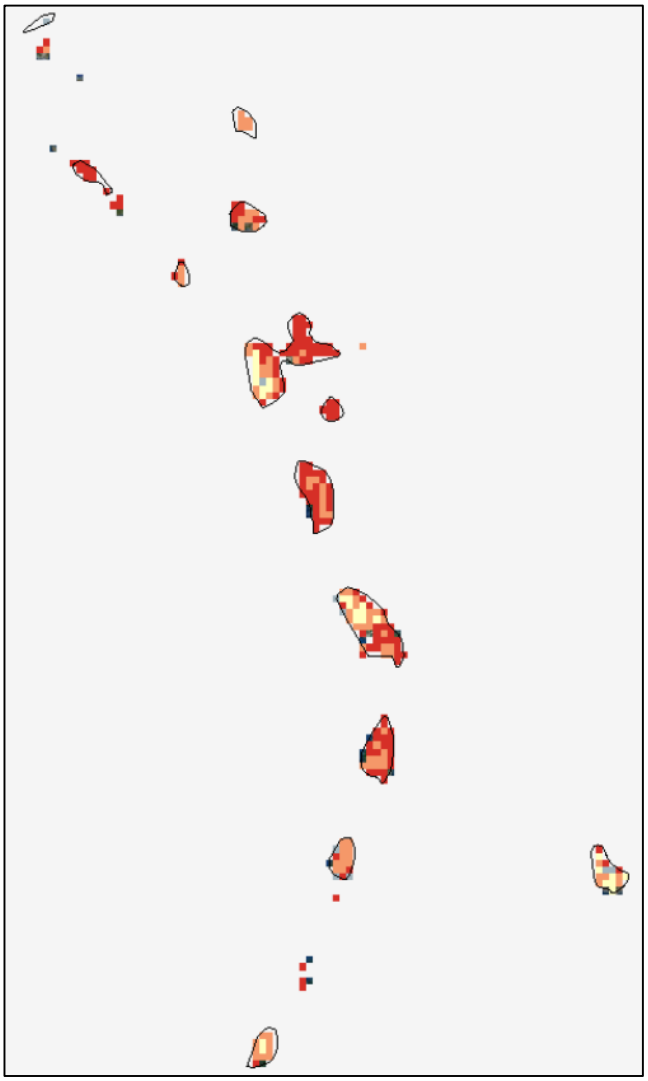
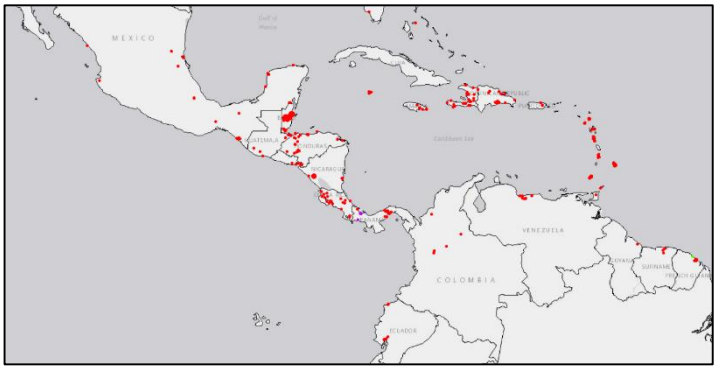
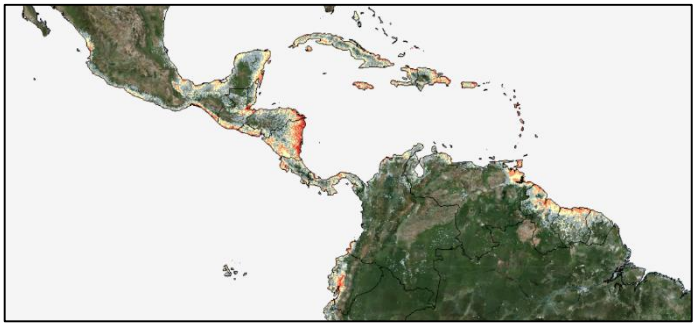
Culex (*Cux.*) *nigripalpus* Theobald, 1901







VectorMap data points for *Cx. nigripalpus* 2738 records accessed October, 2017



Maximum entropy habitat suitability model *Cx. nigripalpus* Dornak, 2011

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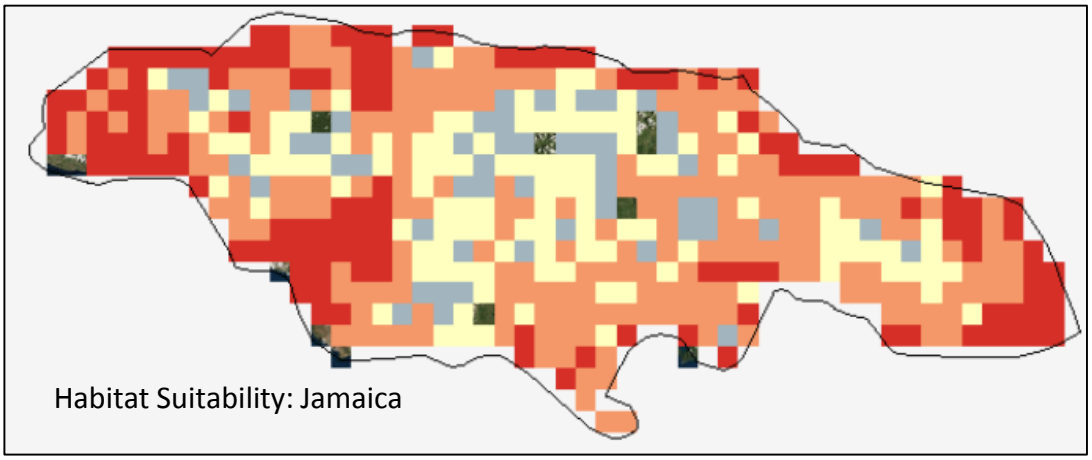
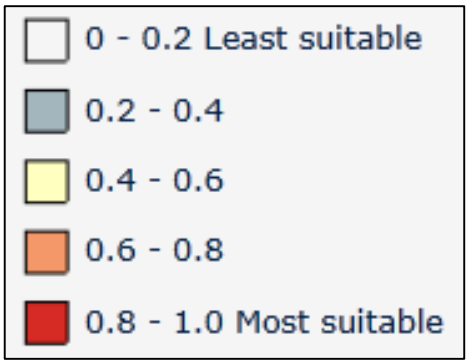
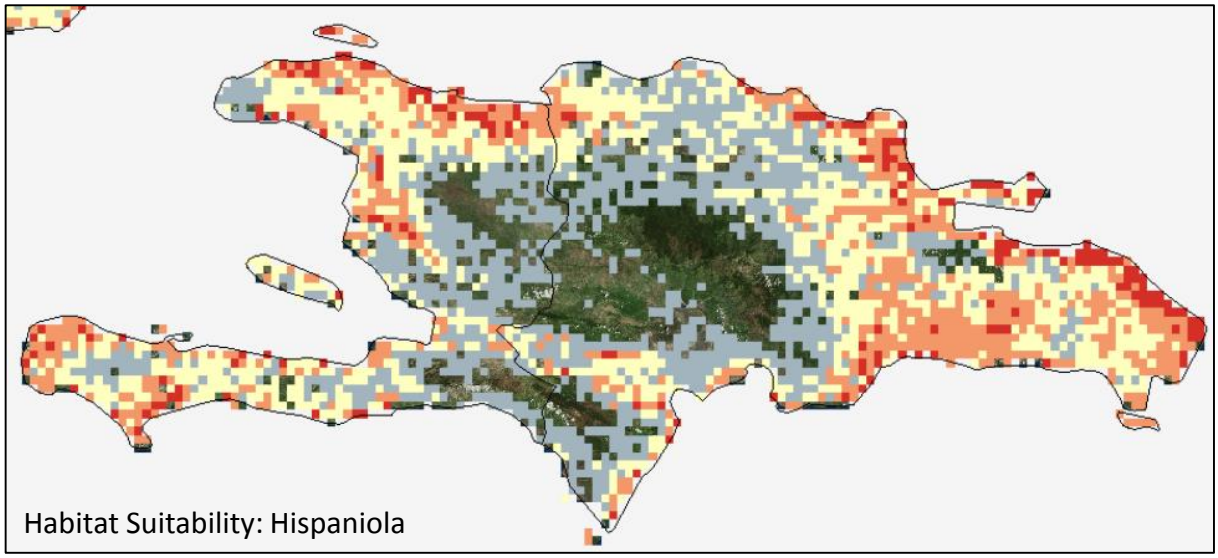
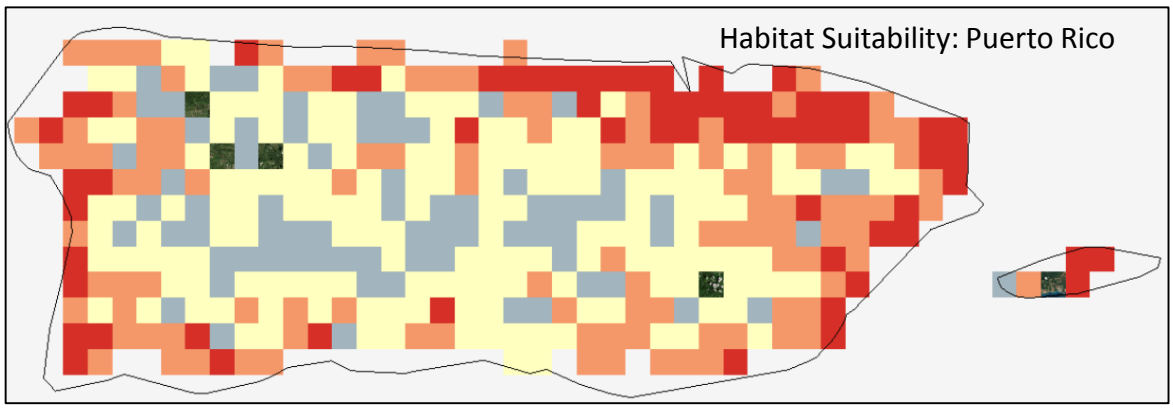
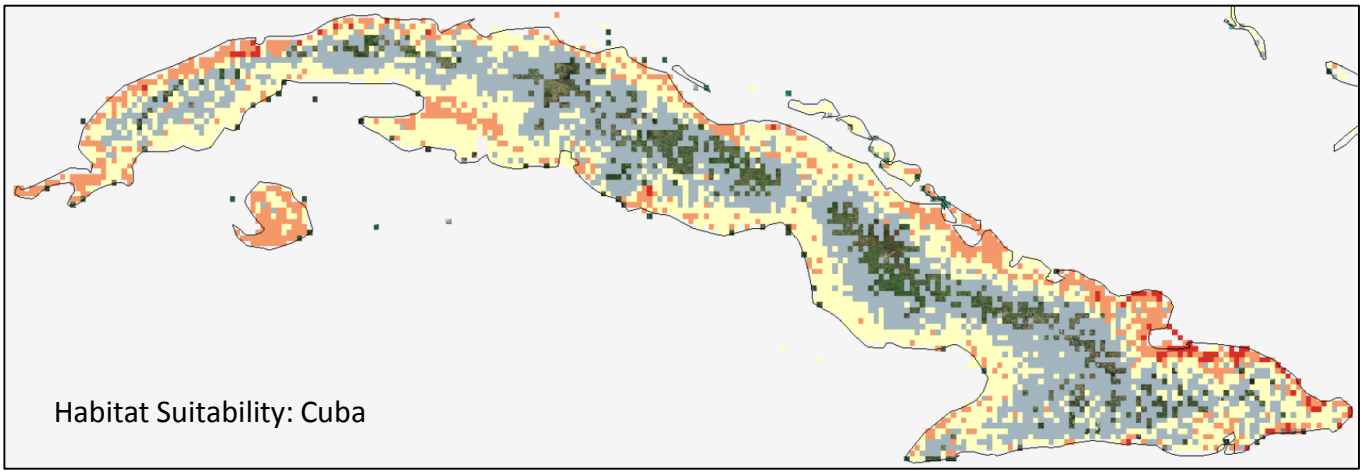
Culex (*Cux*.) *nigripalpus* Theobald, 1901











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Culex (Cux.) quinquefasciatus Say, 1823

Bionomics:

Larvae of *Cx. quinquefasciatus* can be found in bodies of water containing a high degree of organic pollution and close to human habitation. Females readily enter houses at night and bite humans in preference to other mammals (Sirivanakarn, 1976).

Medical Importance:

This species is a vector of avian malaria, a primary vector of Wuchereria bancrofti. Western equine encephalomyelitis and St. Louis encephalitis have also been isolated from this species and it has been implicated as a vector of dog heartworm (Carpenter and LaCasse 1955, Sirivanakarn 1976).

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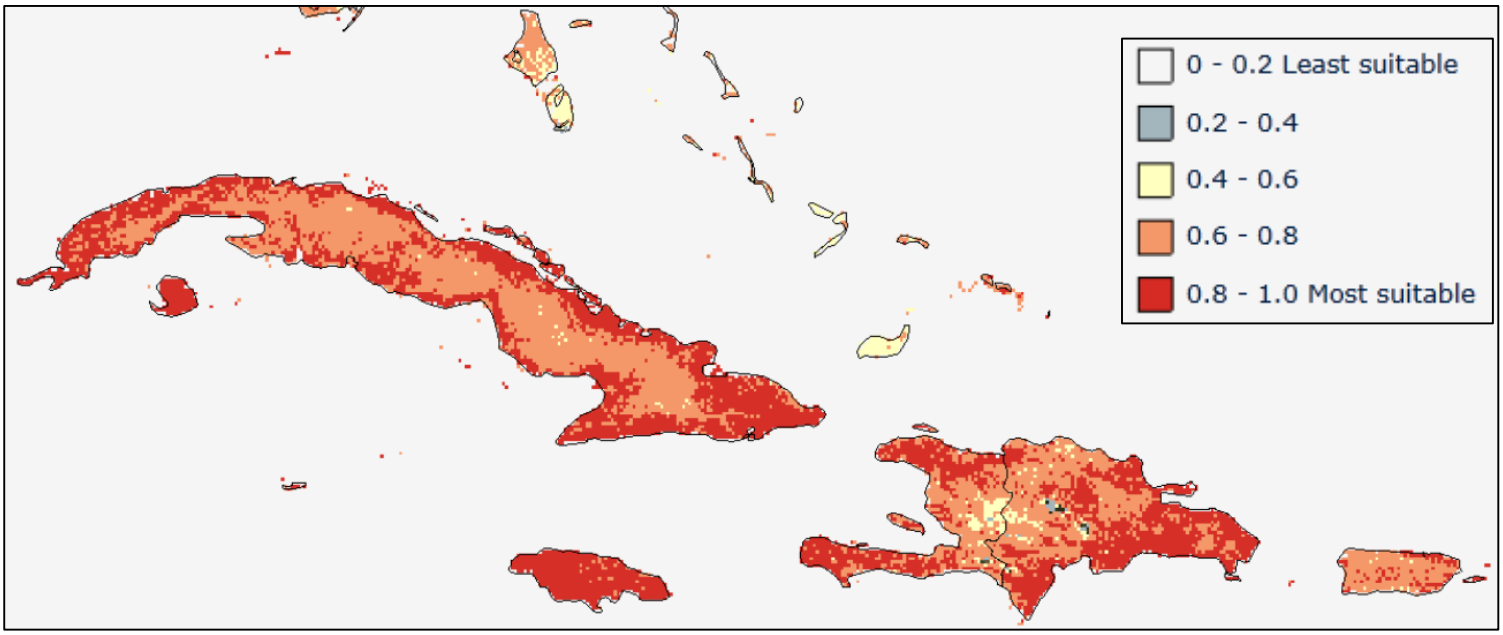
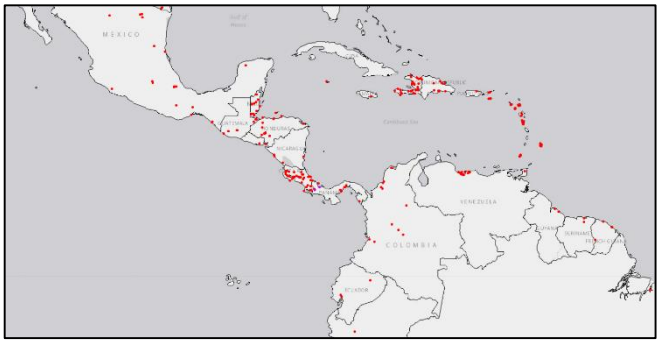
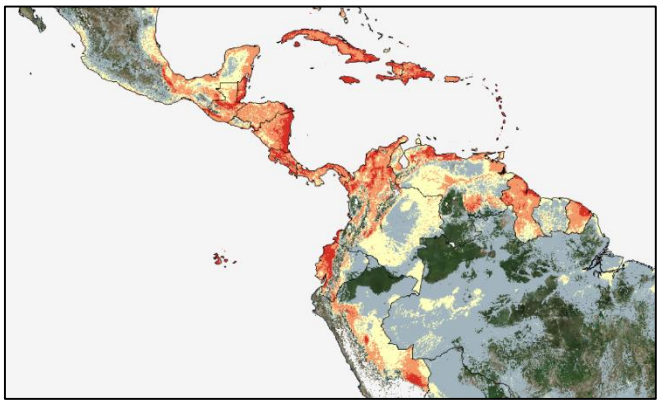
Culex (Cux.) quinquefasciatus Say, 1823





VectorMap data points for *Cx. quinquefasciatus*
5646 records accessed October, 2017



Maximum entropy habitat suitability model *Cx. quinquefasciatus* Nyari, 2011

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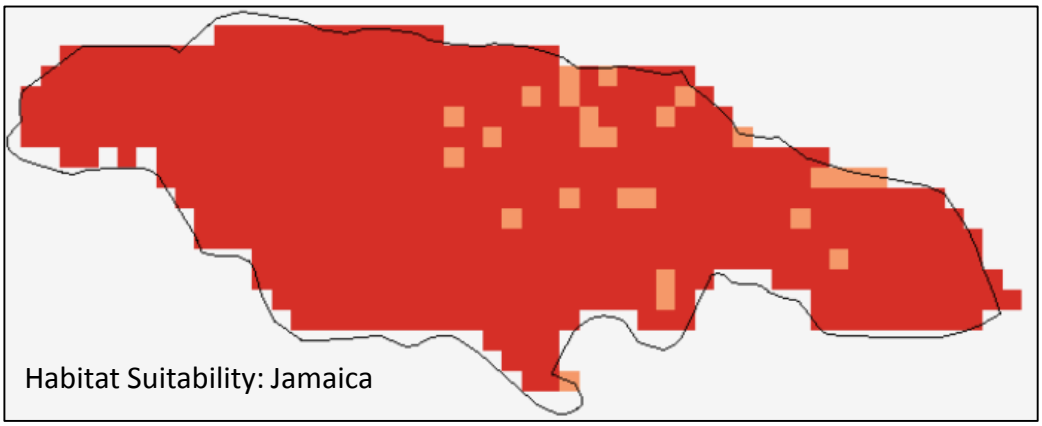
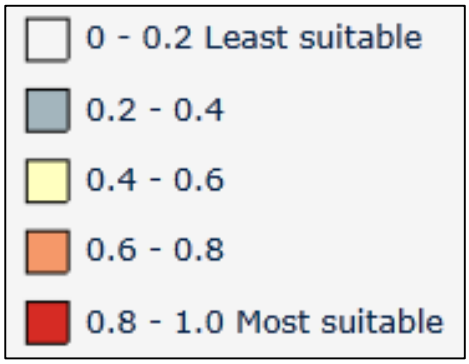
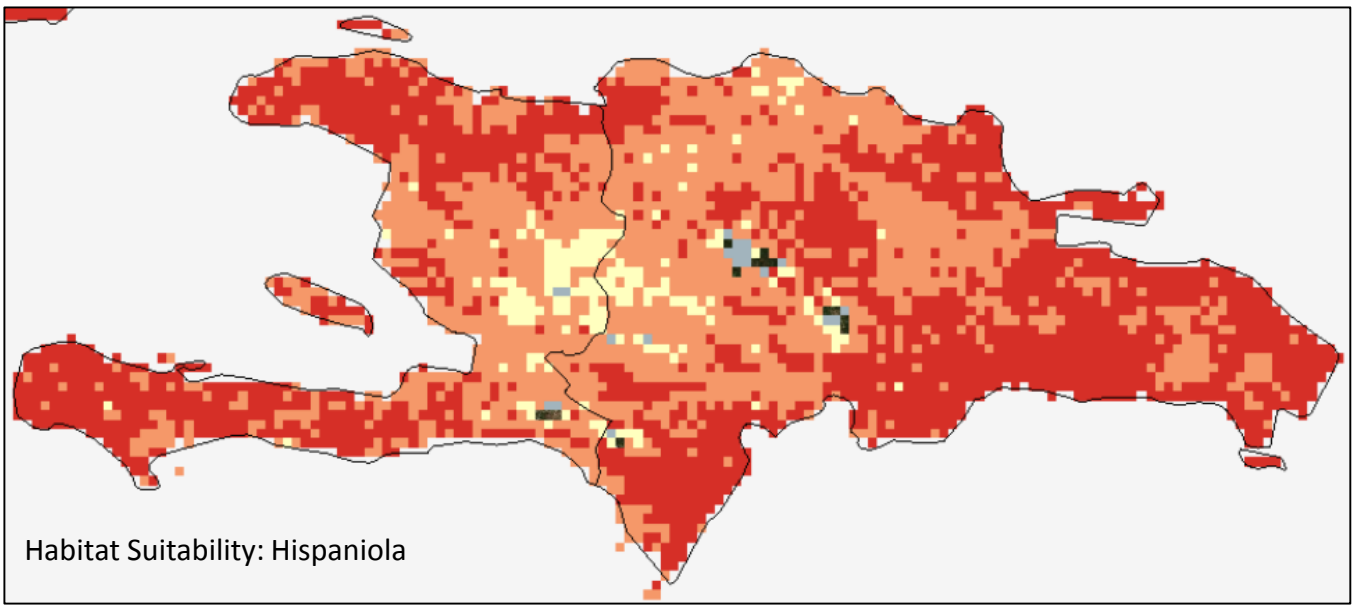
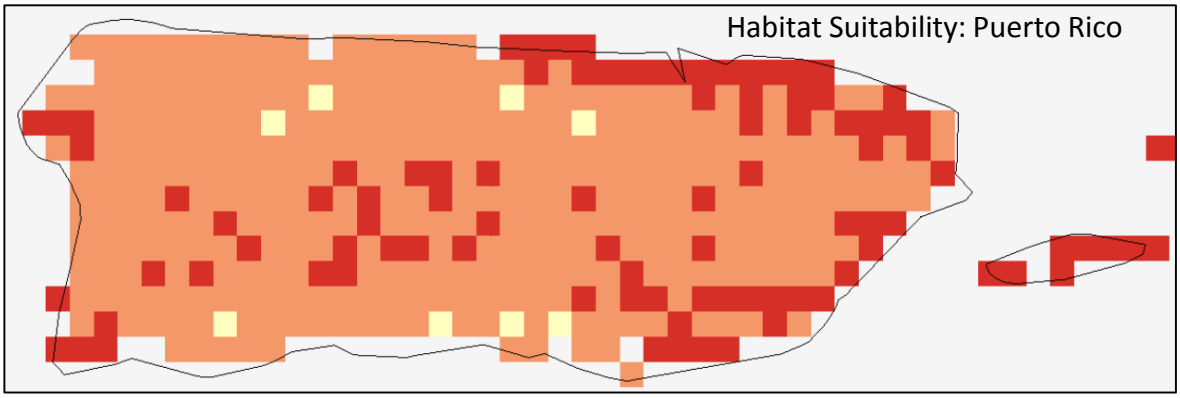
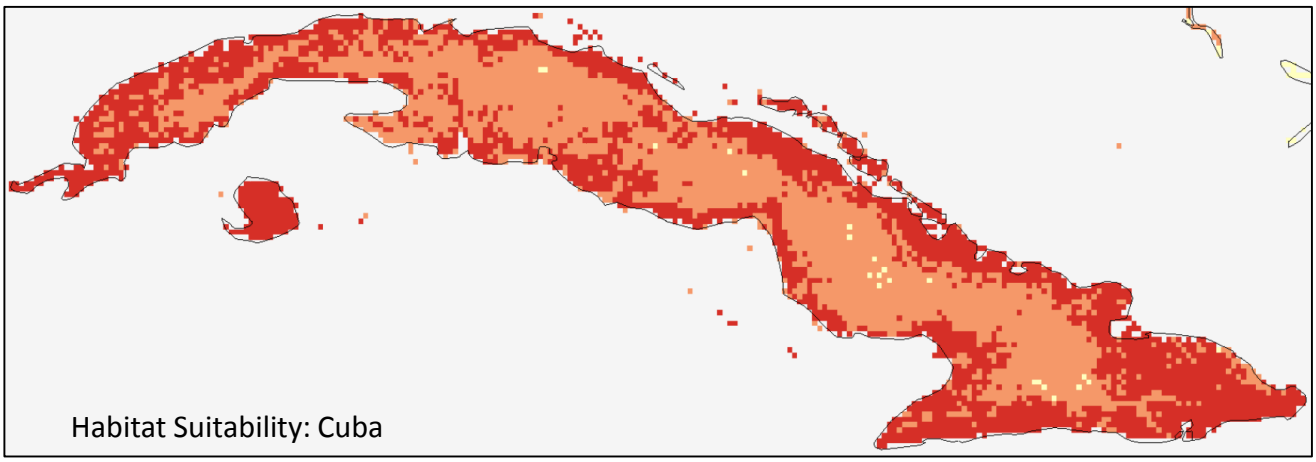
Culex (Cux.) quinquefasciatus Say, 1823











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Culex (*Mel.*) *erraticus* (Dyar and Knab, 1906)

Bionomics:

The larvae of *Cx. erraticus* have been found in semi-permanent and permanent pools including ditches, floodwater areas, grassy pools, streams, and occasionally in bilge water of boats and other artificial collections of water. (Carpenter and LaCasse, 1955).

Medical Importance:

Culex erraticus is a known vector of Eastern equine encephalitis virus (EEEV) and Venezuelan equine encephalitis virus (VEEV). West Nile virus (WNV) has also been isolated from wild caught specimens (Mendenhall, 2012).

[WRBU Species Page]

Culex (*Mel.*) *taeniopus* Dyar and Knab, 1907

Bionomics:

Adult *Cx. taeniopus* were collected resting in vegetation and were attracted to human bait near sunset and to CDC traps set in secondary forests, and along edges of swamps and rivers. Larvae are reported from stagnant water (Sallum and Forattini 1996).

Medical Importance:

This species has been found under laboratory conditions to be susceptible to infections by Venezuelan equine encephalitis virus (VEEV) and is also considered a vector of several members of the Family Bunyavididae including Ossa, Guama, Ananindeua, Bimiti, Mirim and Guaratuba viruses (Sallum and Forattini, 1996).

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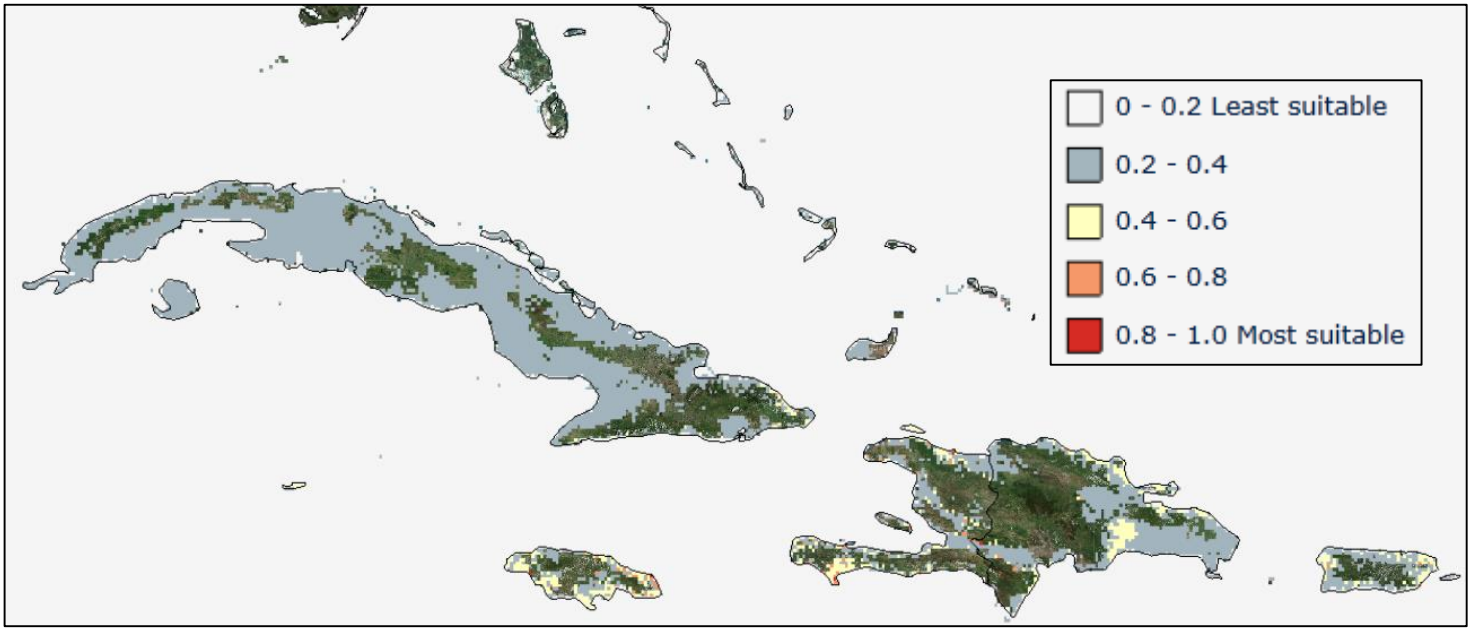
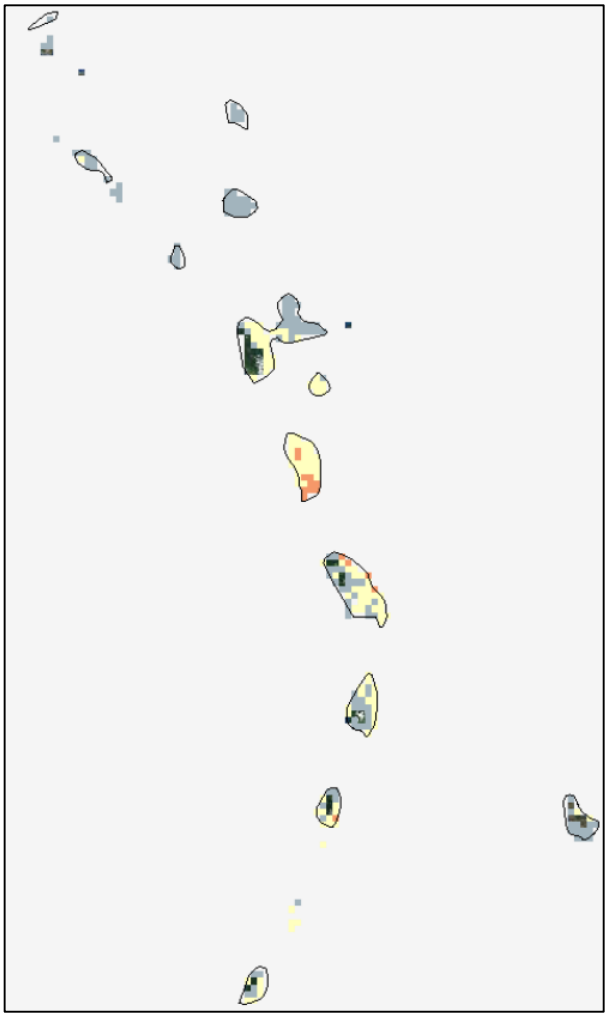
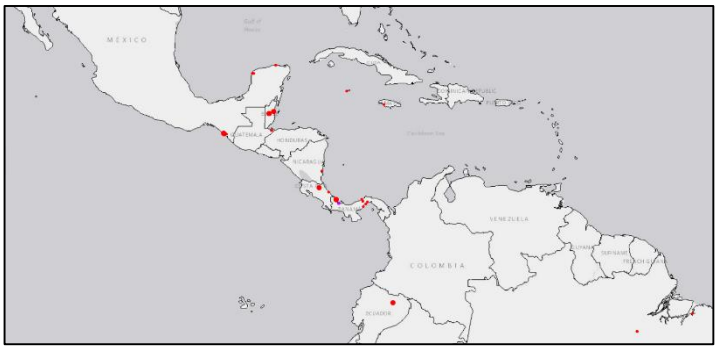
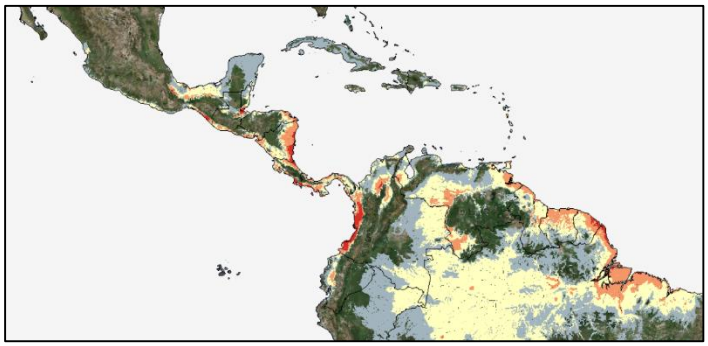
Culex (*Mel.*) *taeniopus* Dyar and Knab, 1907







VectorMap data points for *Cx. taeniopus* 169 records accessed October, 2017



Maximum entropy habitat suitability model *Cx. taeniopus* Dornak 2011

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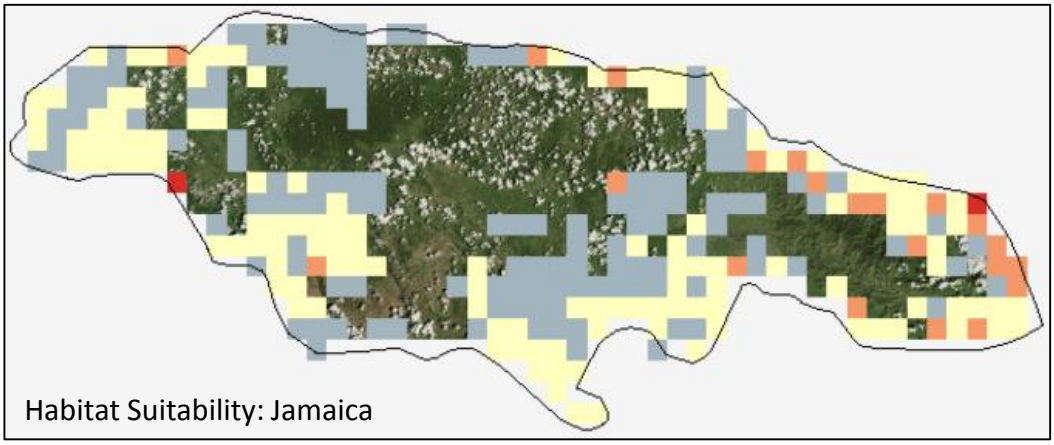
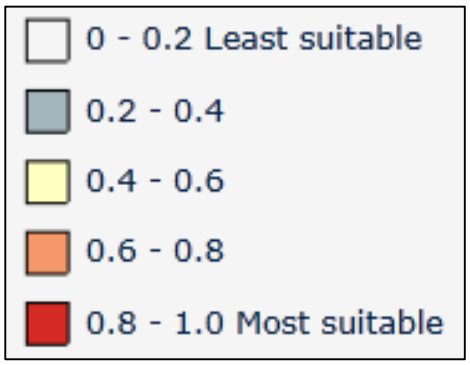
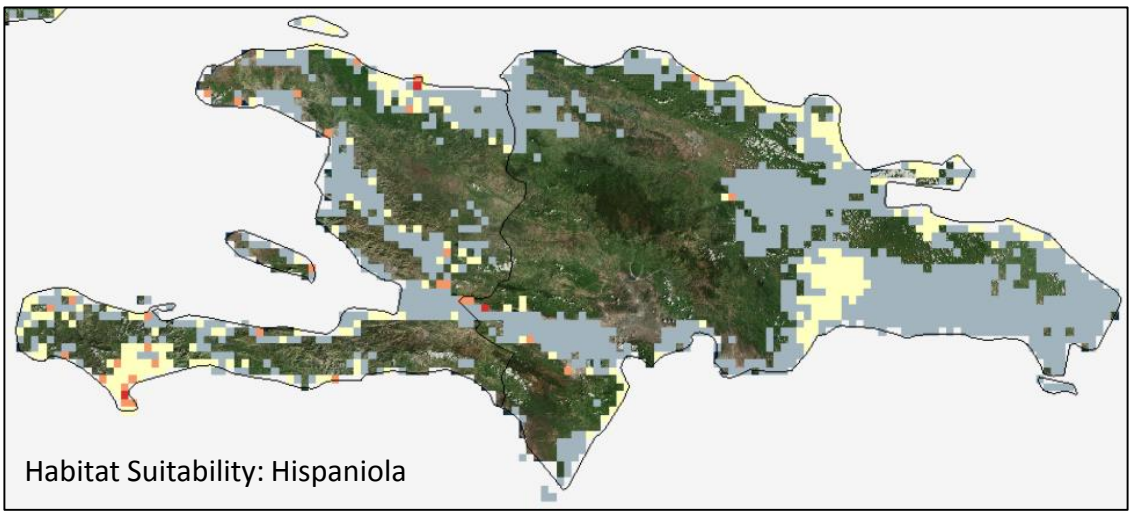
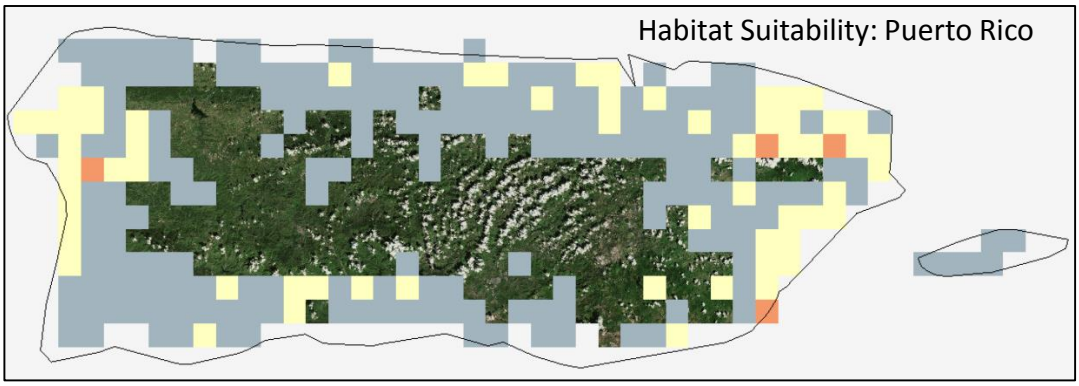
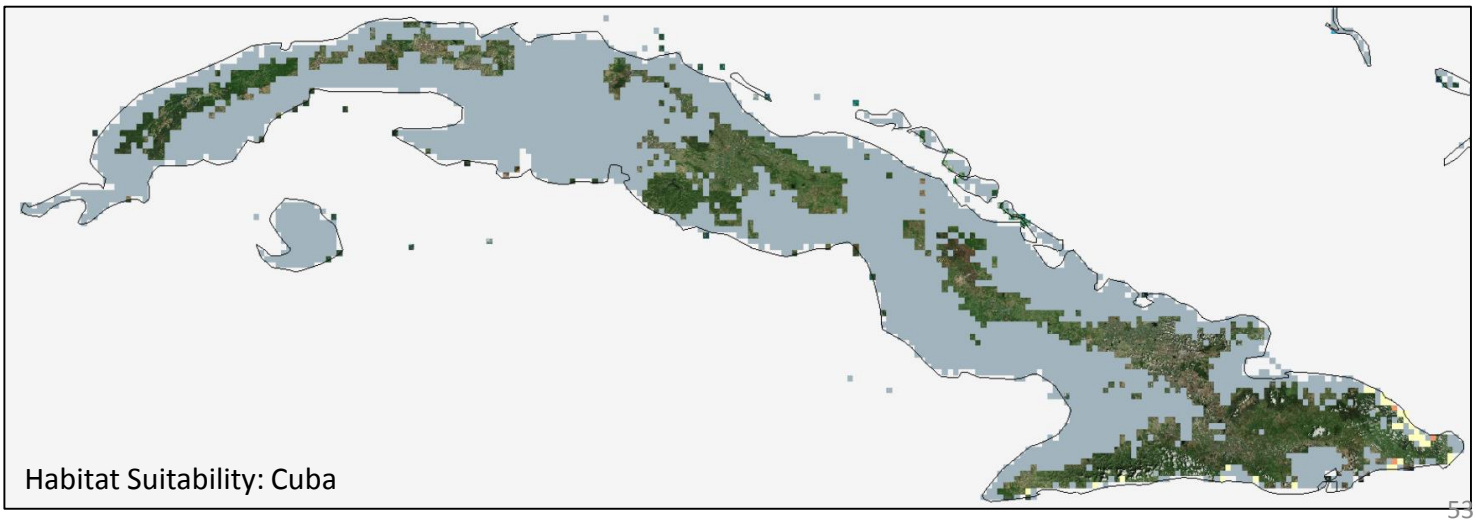
Culex (*Mel.*) *taeniopus* Dyar and Knab, 1907











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Mansonia (*Man.*) *titillans* (Walker, 1848)

Bionomics:

After hatching, larvae of *Ma. titilans* attach themselves to the submerged roots of aquatic plants from which they obtain oxygen. The pupae also remain attached to the roots of the plants until time for emergence of the adults. Water lettuce (Pistia) and water hyacinth (*Eichornia crassipes*) are claimed to be the principal host plant. The females are troublesome outdoor biters and are known to fly several miles from marshes, ponds, and lakes where their immature stages occur (Carpenter and LaCasse, 1955).

Medical Importance:

Venezuelan equine encephalitis virus (VEEV) has been recovered from wild-caught *Mansonia titillans* in Trinidad and it is believed that the species may have been an important vector of this disease during an epidemic in Trinidad in 1942-1943. According to Belding, this species is known to be a vector of filariasis as well (Carpenter and LaCasse 1955).

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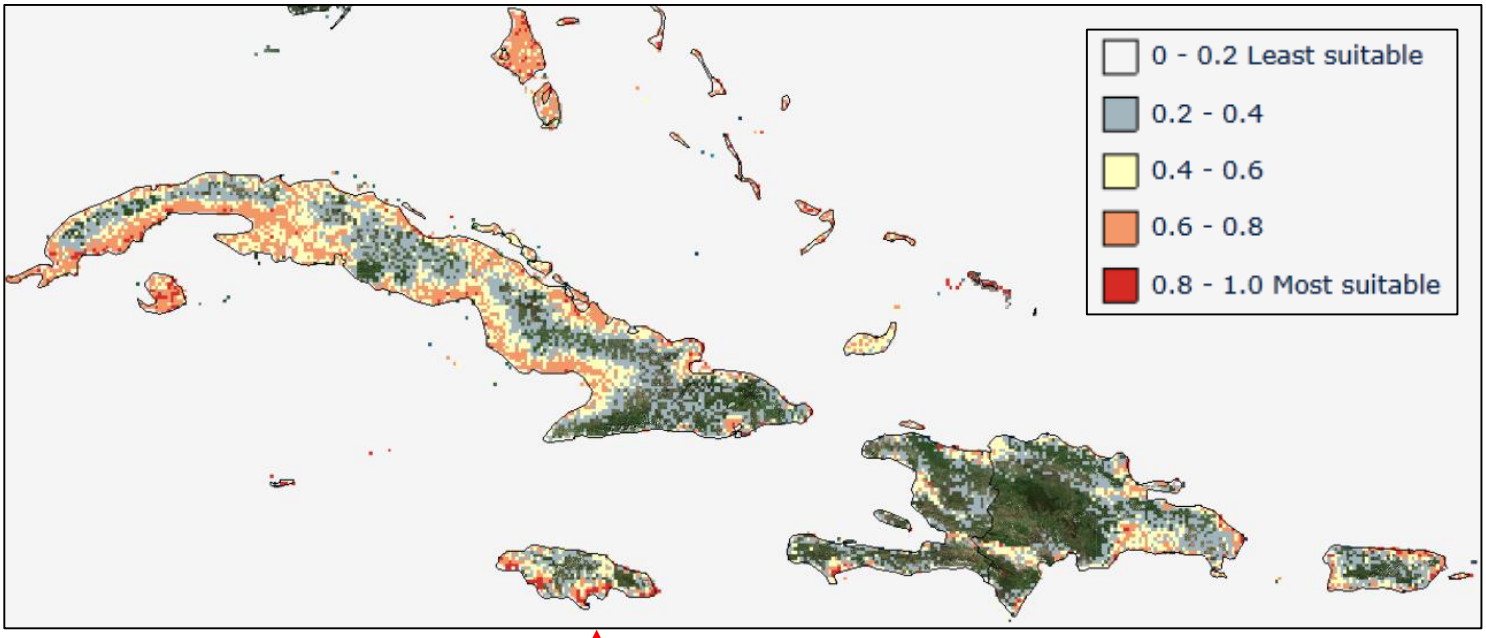
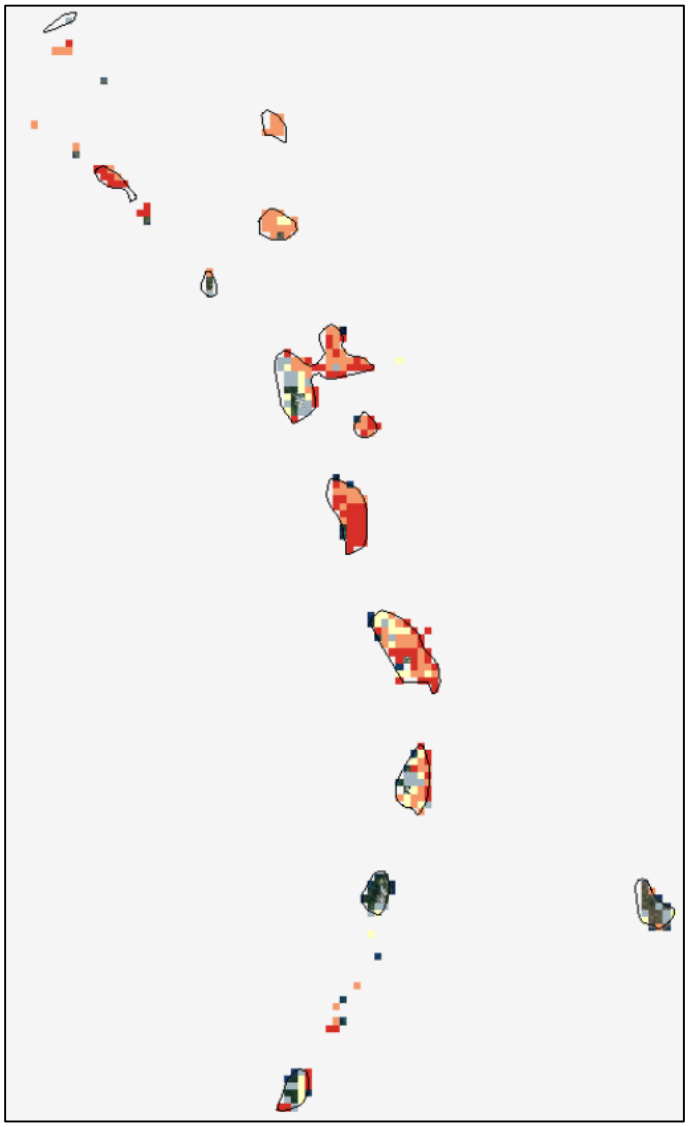
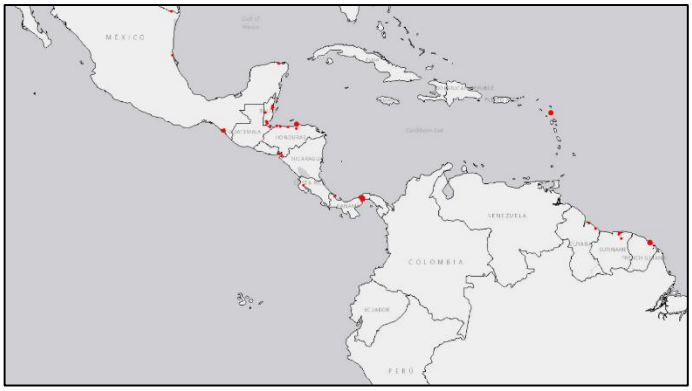
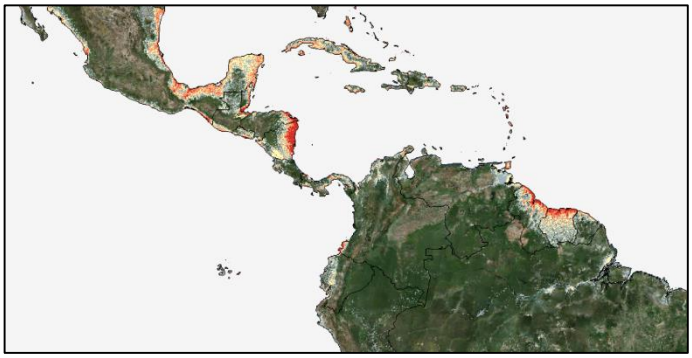
Mansonia (*Man.*) *titillans* (Walker, 1848)







VectorMap data points for *Ma. titillans* 684 records accessed October, 2017



Maximum entropy habitat suitability model *Ma. titillans* Dornak 2011

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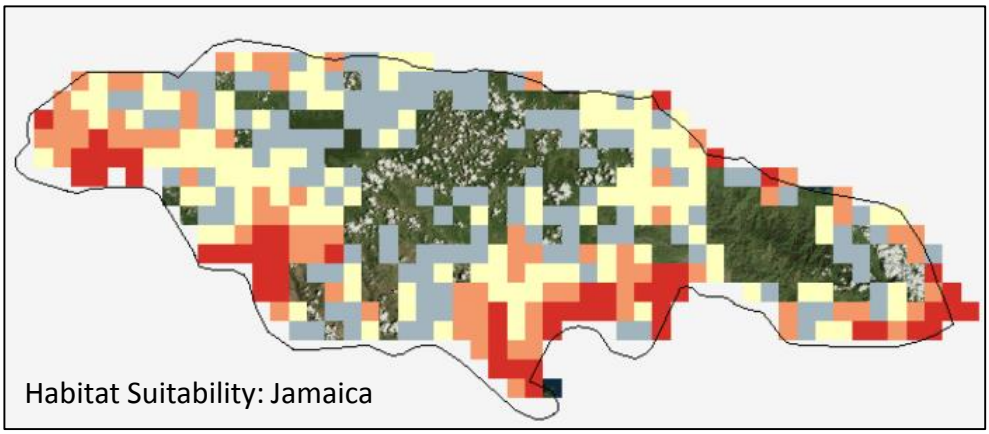
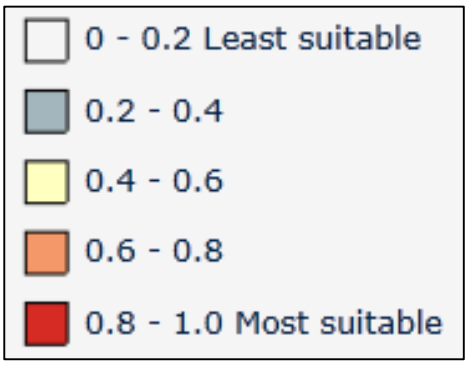
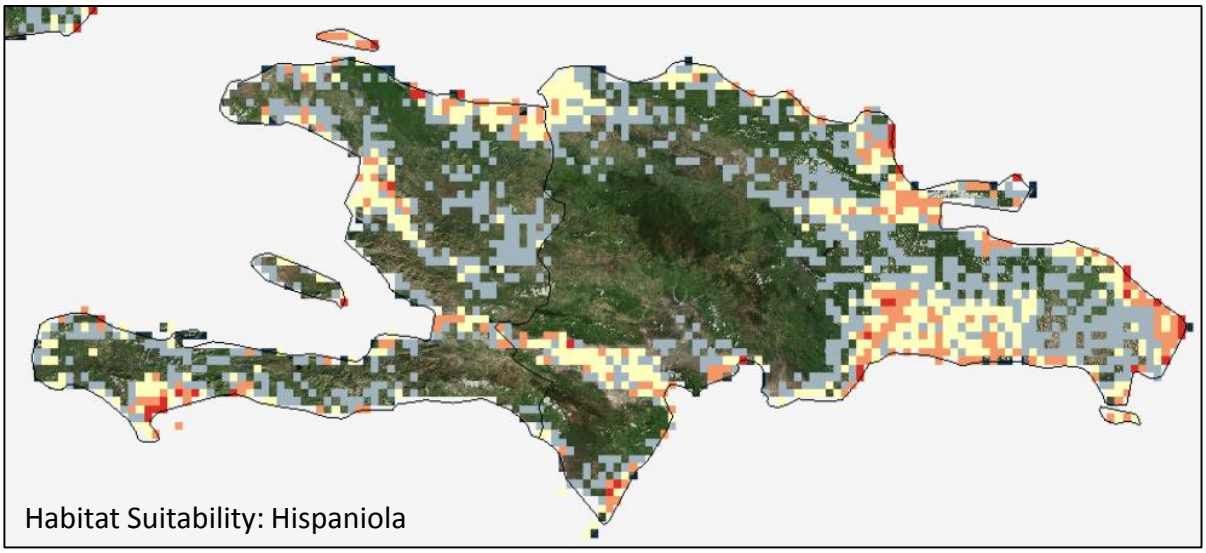
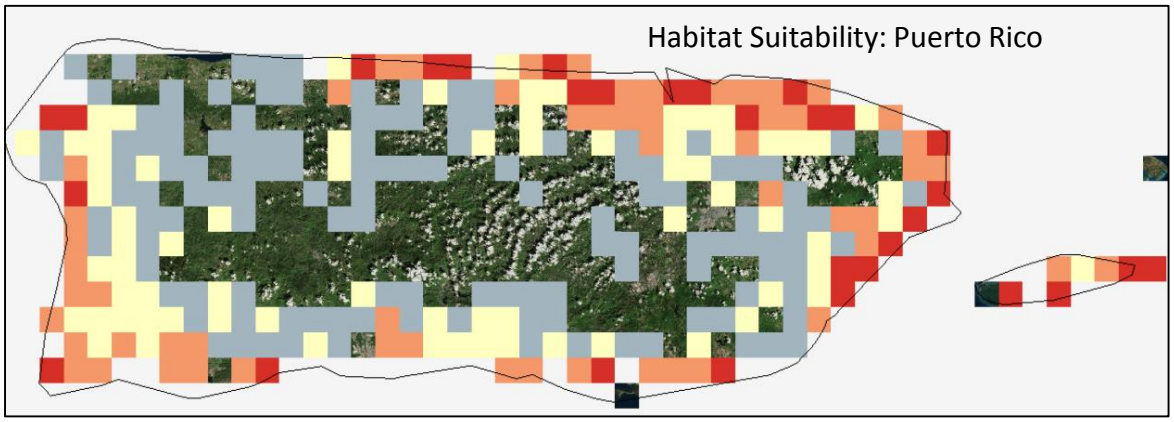
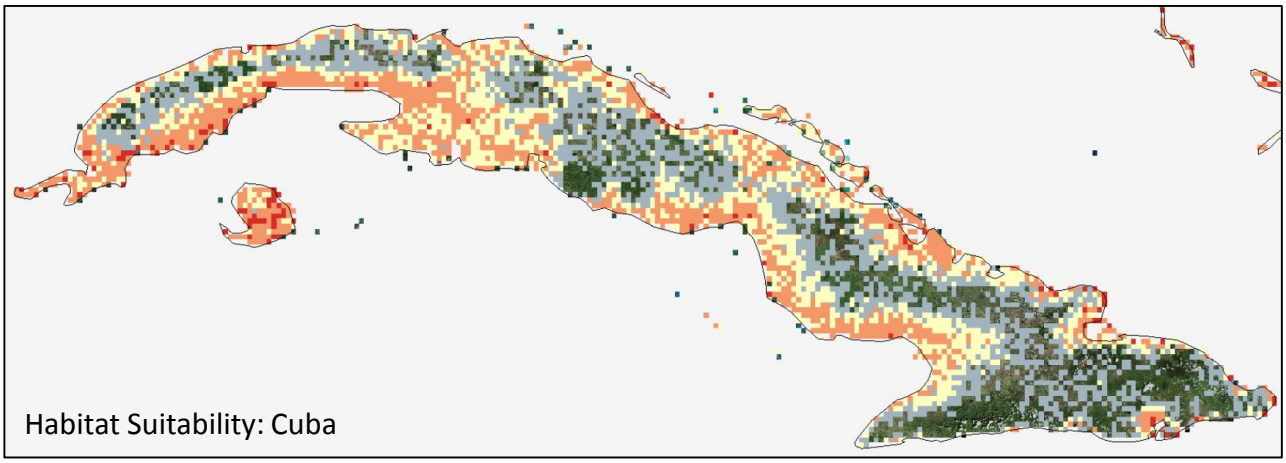
Mansonia (*Man.*) *titillans* (Walker, 1848)











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Psorophora (Gra.) columbiae (Dyar and Knab, 1906)

Bionomics:

Larvae of *Ps. columbiae* are found in temporary fresh water ground pools where vegetation is present but have also been found in brackish water as well. Larvae have been collected in flooded rice fields and roadside ditches with grass present (Meisch, 1994).

Medical Importance:

Ps. columbiae is a confirmed vector of Venezuelan equine encephalitis virus (VEEV) (Meisch, 1994).

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Identification Keys to the Mosquitoes of the Caribbean:

WRBU Lucid Computerized Keys

1. Rueda, Leopoldo M. 2004. Pictorial keys for the identification of mosquitoes (Diptera: Culicidae) associated with dengue virus transmission. Walter Reed Army Institute of Research Washington DC Department of Entomology.
2. Gjullin, C. M. 1946. A key to the Aedes females of America north of Mexico (Diptera, Culicidae)." Proc. Ent. Sot. Washington. Vol. 48.
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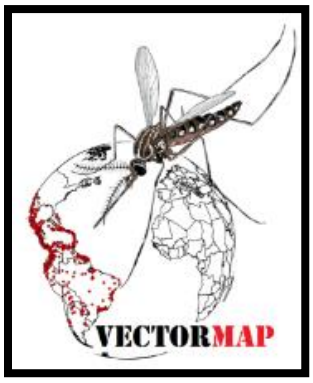
Vector Photos Provided by Judith Stoffer, Walter Reed Biosystematics Unit



VectorMap is only as good as the data you provide. If you have collection records, models or pathogen testing results please contact the VectorMap team to learn how to contribute data at mosquitomap@si.edu

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