



Changing Habitat Suitability in Cassin's Sparrow

John Schnase and Mark Carroll

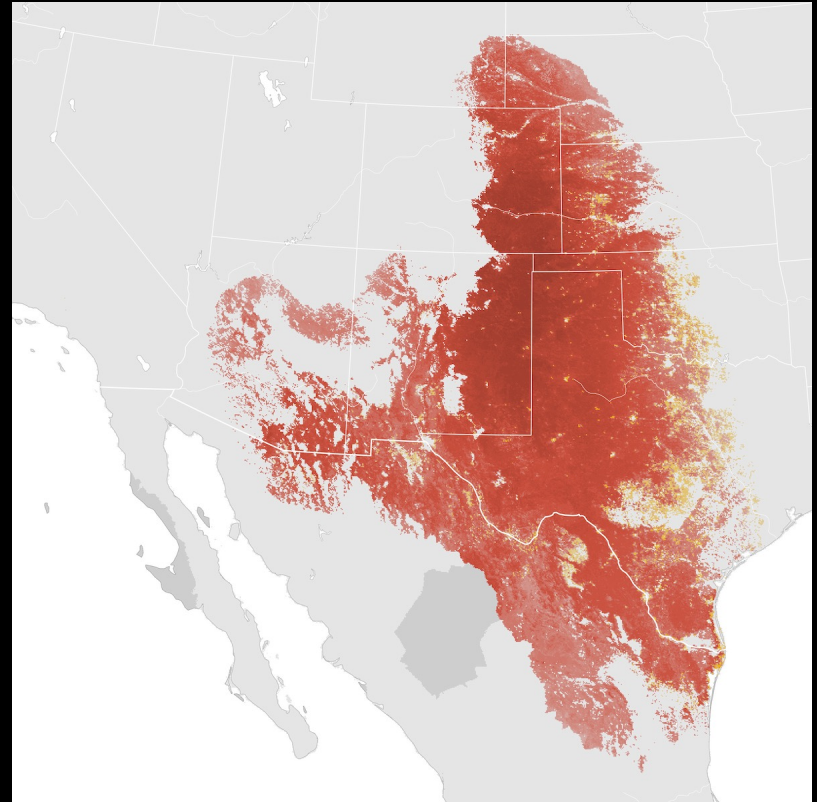
*Office of Computational and Information Sciences and Technology
NASA Goddard Space Flight Center*





Cassin's Sparrow

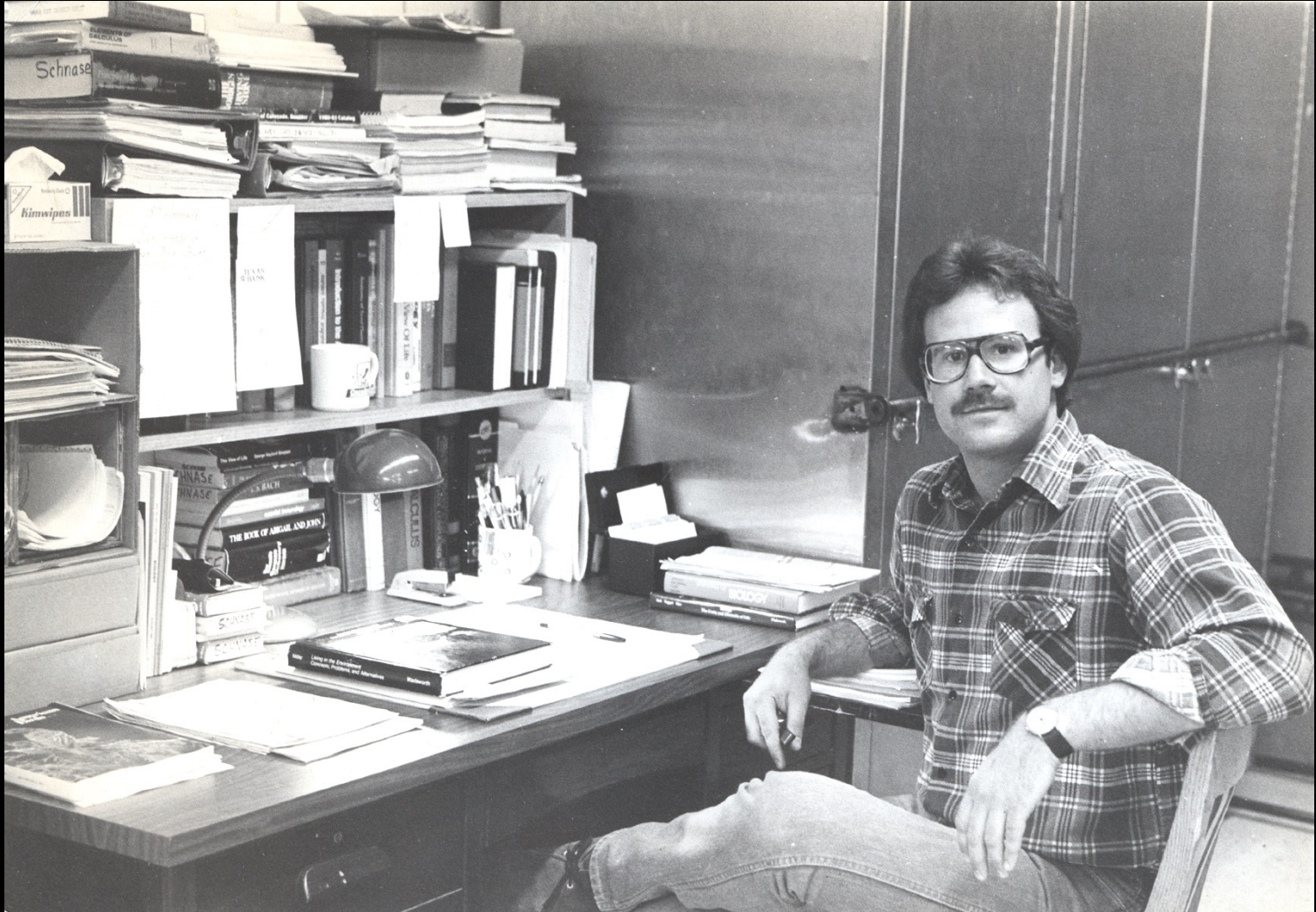
(*Peucaea cassinii* Woodhouse, 1852)





Cassin's Sparrow

(*Peucaea cassinii* Woodhouse, 1852)





Cassin's Sparrow (*Peucaea cassinii* Woodhouse, 1852)



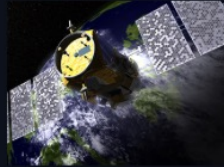
Aqua ›

Time in orbit: 21 years : 13 days



Aura ›

Time in orbit: 18 years : 306 days



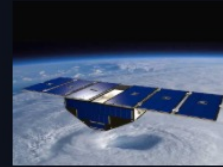
CALIPSO ›

Time in orbit: 17 years : 19 days



CloudSat ›

Time in orbit: 17 years : 19 days



CYGNSS ›

Time in orbit: 6 years : 153 days



ECOSTRESS ›

Time in orbit: 4 years : 322 days



EMIT ›

Time in orbit: 0 years : 344 days



GPM ›

Time in orbit: 9 years : 79 days



GRACE-FO ›

Time in orbit: 4 years : 360 days



GRIFEX ›

Time in orbit: 8 years : 106 days



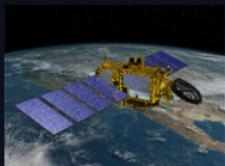
ICESat-2 ›

Time in orbit: 4 years : 244 days



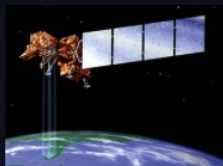
ISS ›

Time in orbit: 24 years : 178 days



Jason-3 ›

Time in orbit: 7 years : 121 days



Landsat 7 ›

Time in orbit: 24 years : 32 days



Landsat 8 ›

Time in orbit: 10 years : 95 days



Landsat 9 ›

Time in orbit: 1 year : 232 days



OCO-2 ›

Time in orbit: 8 years : 319 days



OCO-3 ›

Time in orbit: 4 years : 13 days



Sentinel-6 Michael
Freilich ›



SMAP ›

Time in orbit: 8 years : 106 days



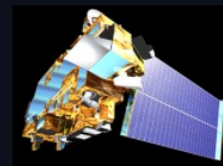
Suomi NPP ›

Time in orbit: 11 years : 202 days



SWOT ›

Time in orbit: 0 years : 153 days



Terra ›

Time in orbit: 23 years : 151 days



Habitat Suitability Modeling

Species	Longitude	Latitude
Cassins_Sparrow	-104.05338	38.953796
Cassins_Sparrow	-99.326675	30.22521
Cassins_Sparrow	-100.64944	30.578276
Cassins_Sparrow	-103.0697	31.540579
Cassins_Sparrow	-102.55761	33.8912
Cassins_Sparrow	-99.94635	31.738905
Cassins_Sparrow	-99.43283	31.095203
Cassins_Sparrow	-101.75056	35.611298
Cassins_Sparrow	-108.42781	30.77936
Cassins_Sparrow	-115.08277	35.550392
Cassins_Sparrow	-101.96691	37.116665
Cassins_Sparrow	-99.92524	32.475246
Cassins_Sparrow	-104.01474	37.64832
Cassins_Sparrow	-112.23461	34.553085

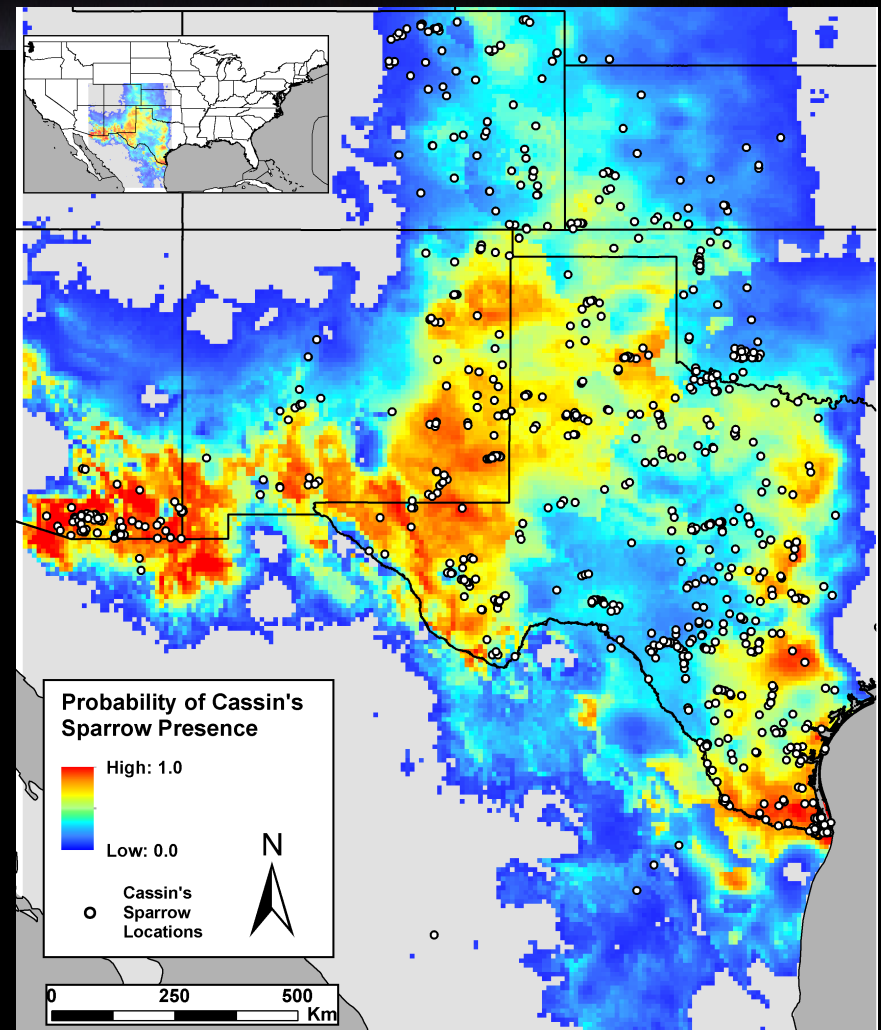
Occurrence
Records
(2015)



Variable Name	Variable Description
ECHANGE	rate of change of total land energy
EVLAND	evaporation from land
EVPSOIL	baresoil evaporative energy flux
EVPTRNS	evapotranspiration
GHLAND	ground heating of land
GWETTOP	soil moisture surface
LHLAND	latent heat
PRECTOTLAND	precipitation
SHLAND	sensible heat
SPLAND	spurious land energy source
TELAND	total energy storage land
TSURF	surface temperature
TWLAND	available water storage land
WCHANGE	rate of change of total land water

Environmental
Variables
(1970-2000)

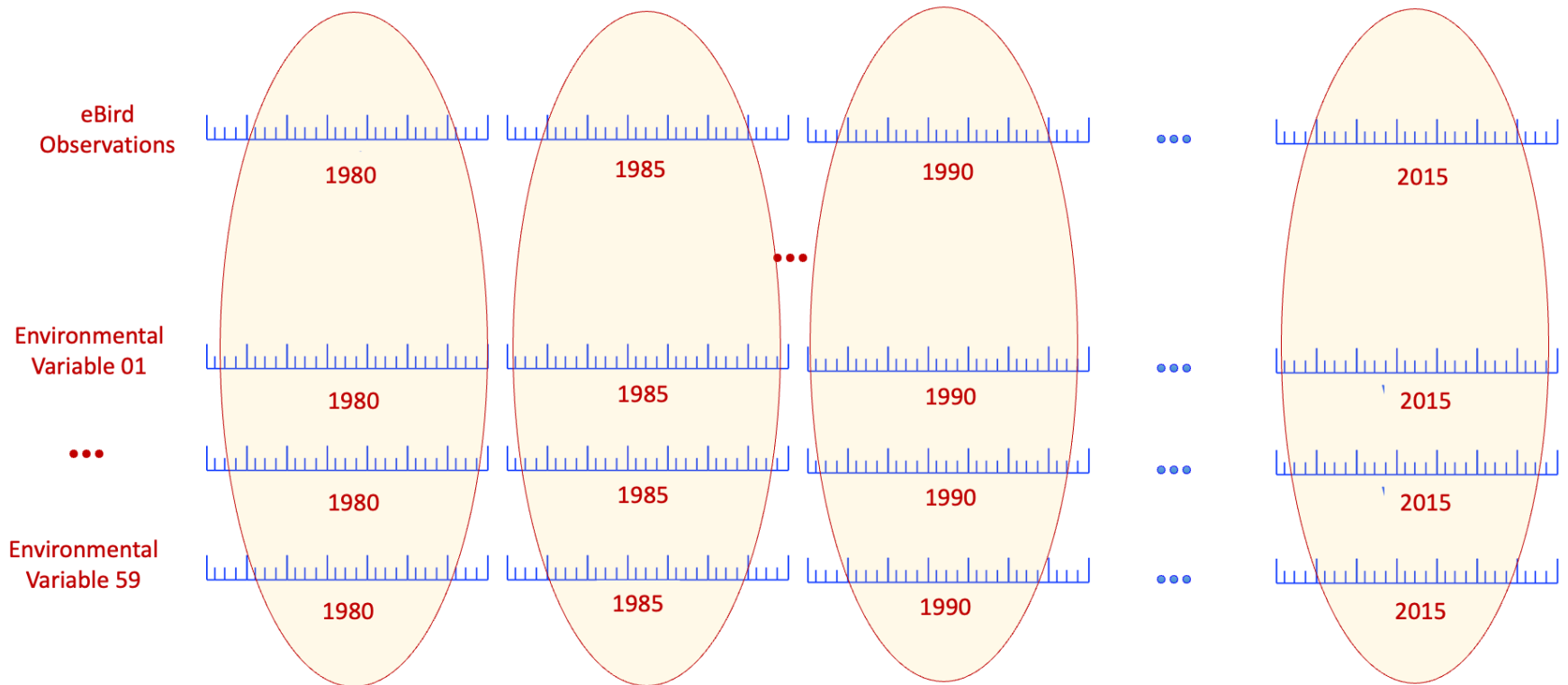
Cassin's Sparrow Habitat Suitability





Habitat Suitability Modeling

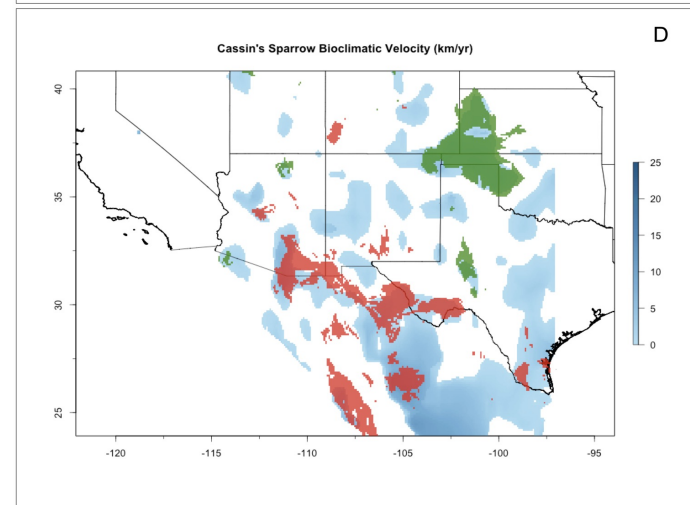
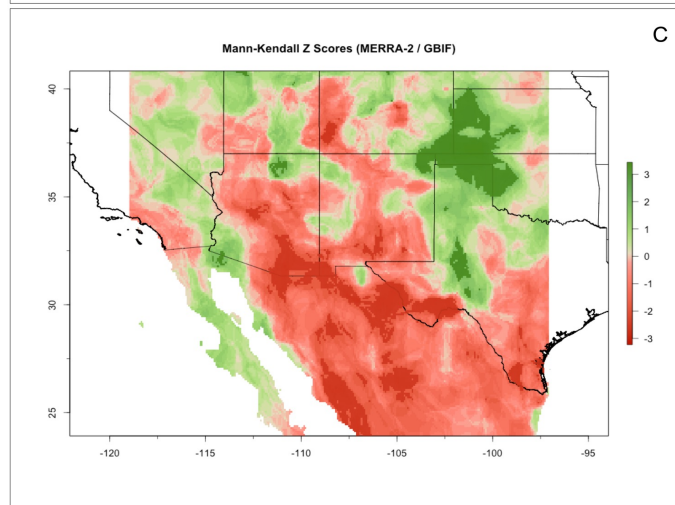
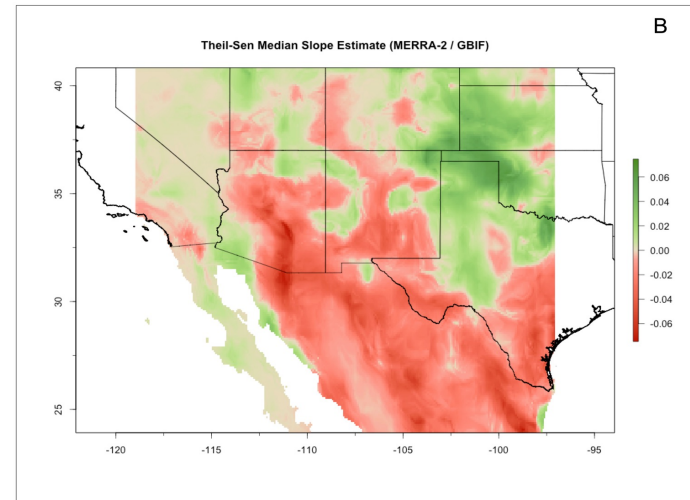
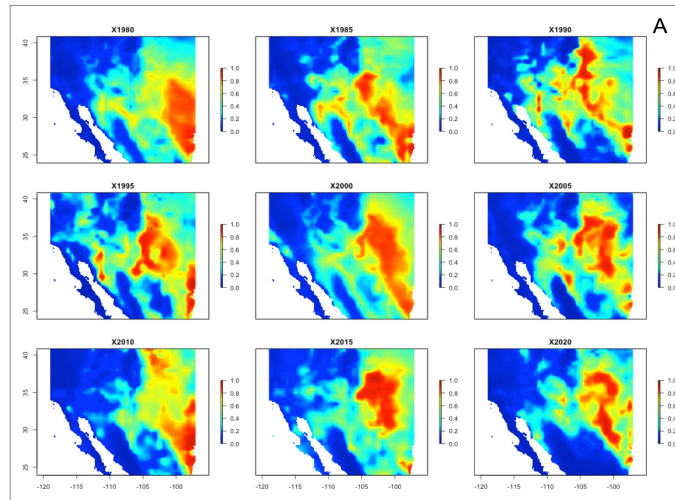
Retrospective Time Series (1980-2019)

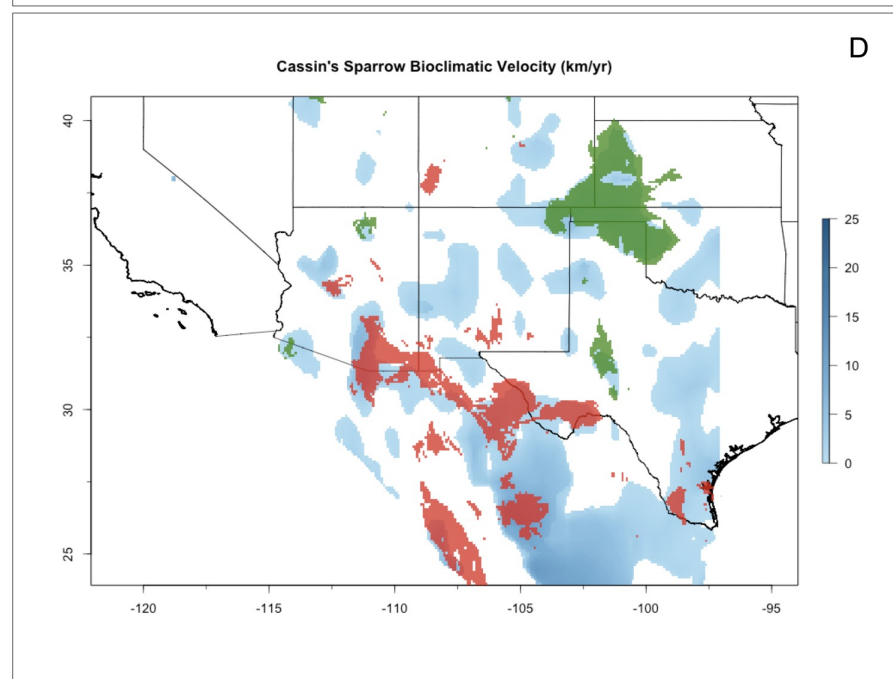
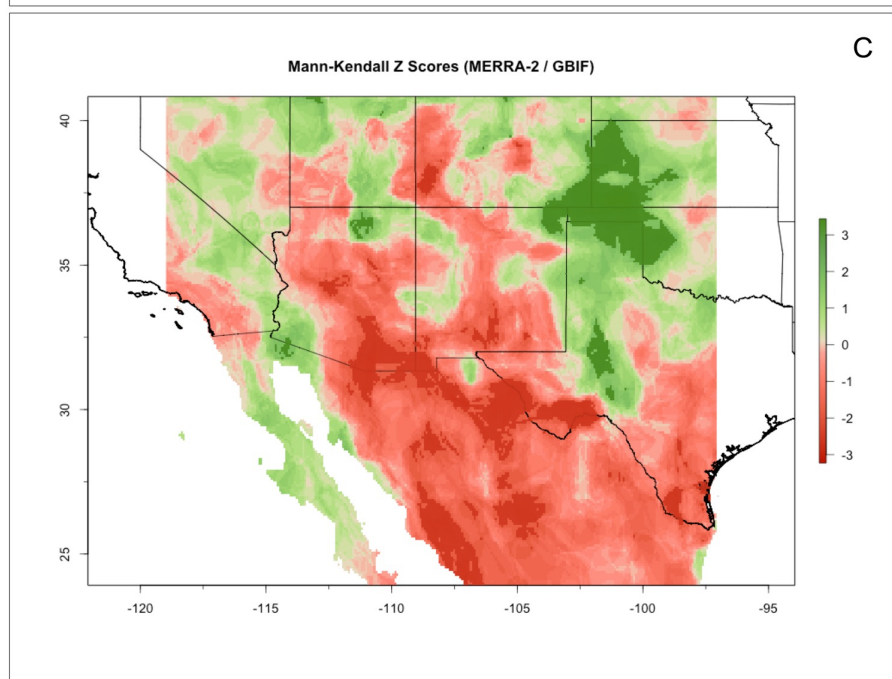
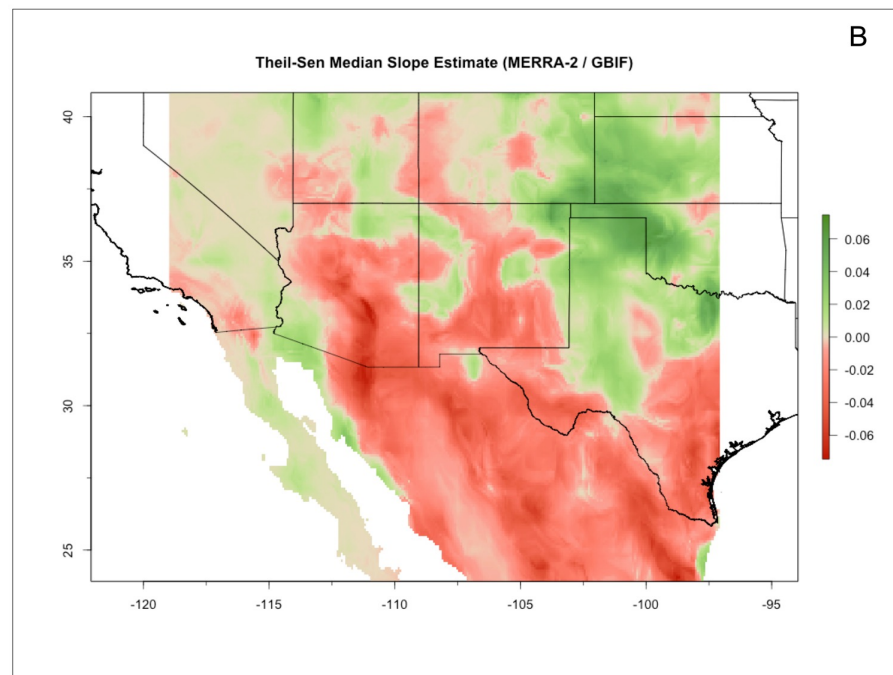
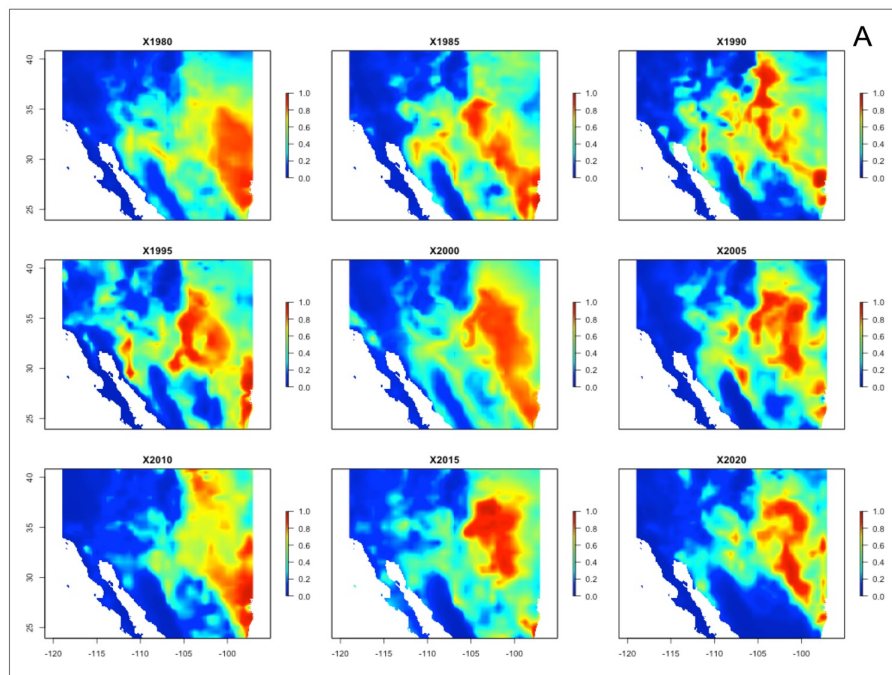




Habitat Suitability Modeling

Retrospective Time Series (1980-2019)







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