

Supplemental Thematic County Maps from ‘Population in floodplains or close to sea level increased in US but declined in some counties—especially among Black residents’

JAMES G TITUS

ENVIRONMENTAL RESEARCH LETTERS

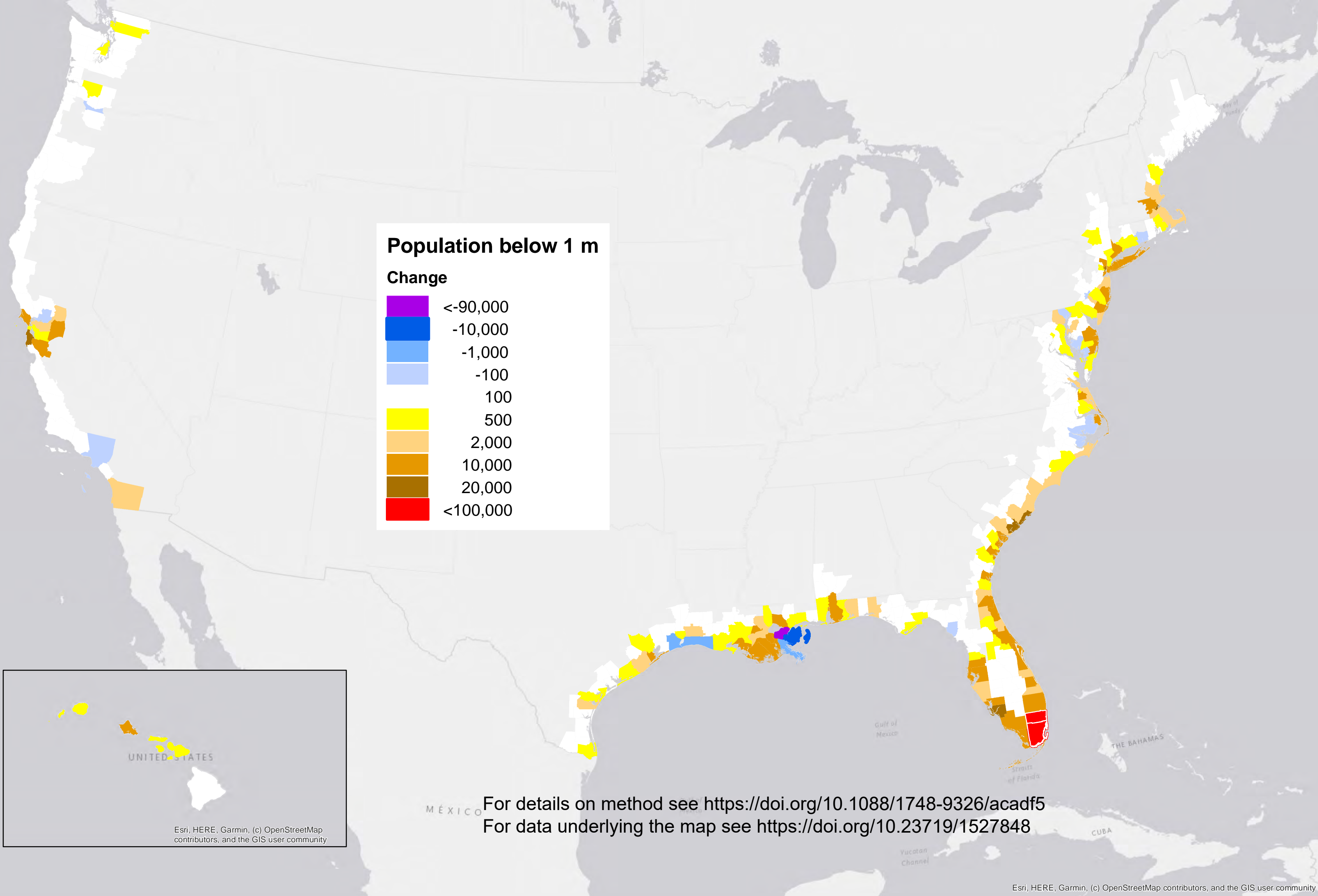
FEBRUARY 2023

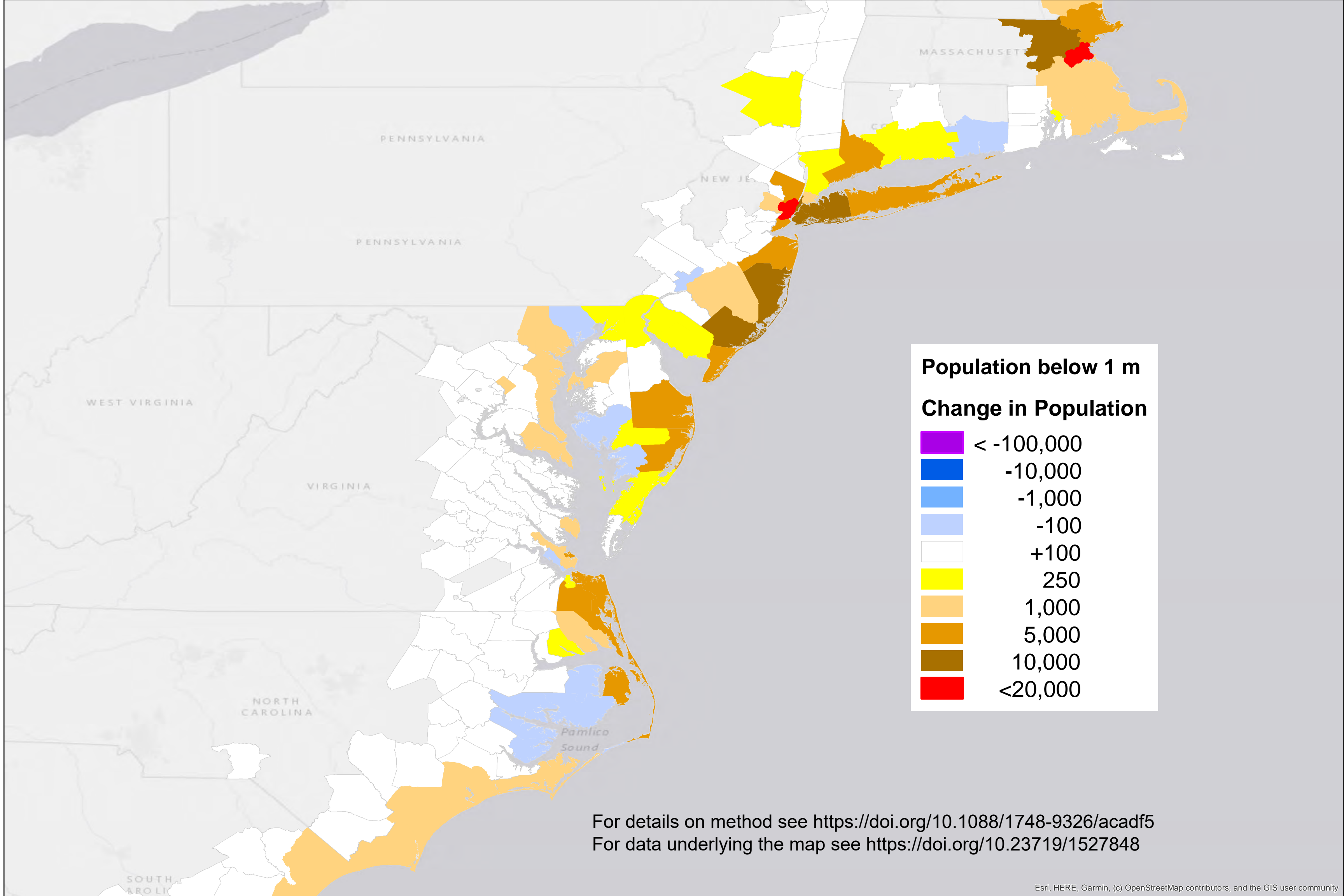
Note: This document contains a subset of the thematic county maps created in the analysis described in the aforementioned paper in Environmental Research Letters. To obtain the other maps or underlying data whence those maps were created, go to EPA’s Science Hub at <https://doi.org/10.23719/1527848>

Change in Population Vulnerable to Sea Level Rise by County

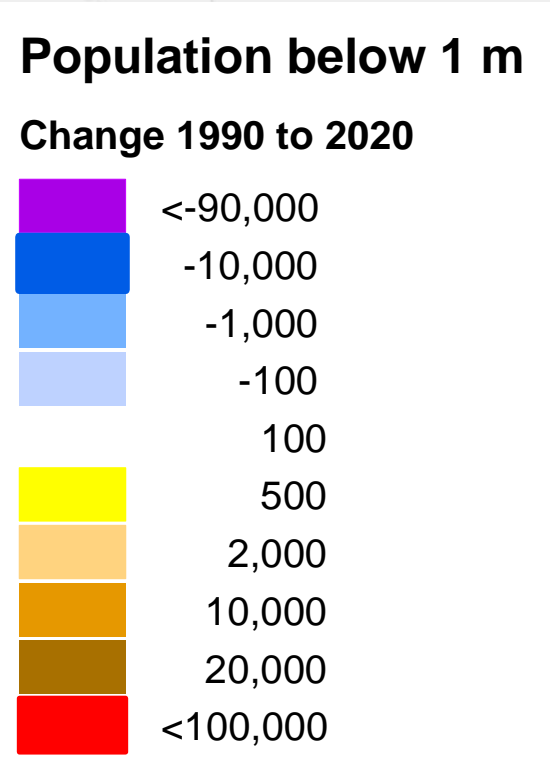
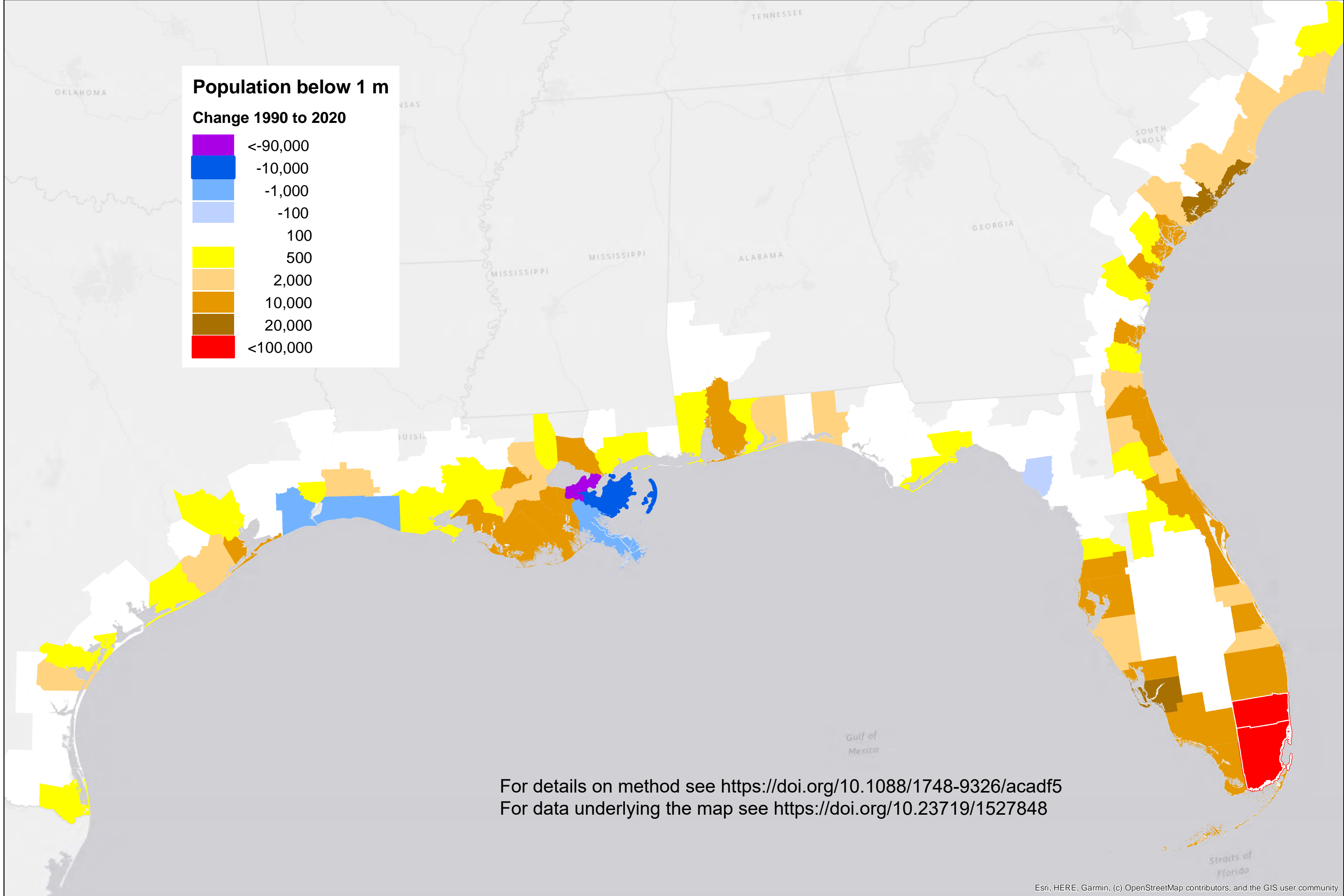
1990 to 2020

These maps show county-specific estimates of the change in populations less than one meter or less than three meters above sea level, as defined and estimated in the paper for which this document provides supplemental maps. Because the sea level rise is rising, the population changes in these maps reflect both the effect of apparent migration (net change from migration, births, and deaths) and homes that were more than one (or three) meters above sea level in 1990 but less than one (or three) meters above sea level by 2020. For further details, see the main paper and the Supplemental Methods associated with this analysis.

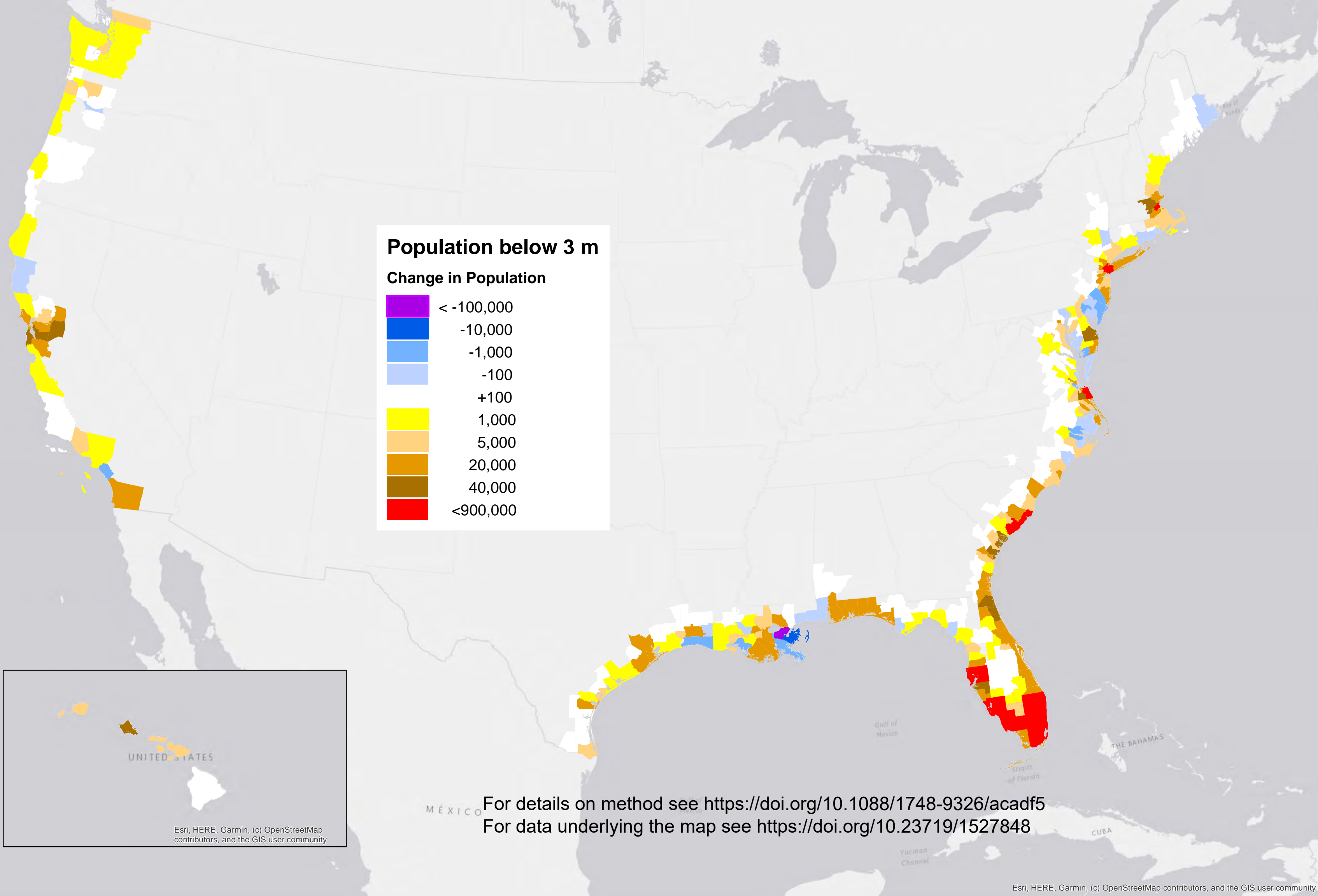




For details on method see <https://doi.org/10.1088/1748-9326/acadf5>
For data underlying the map see <https://doi.org/10.23719/1527848>

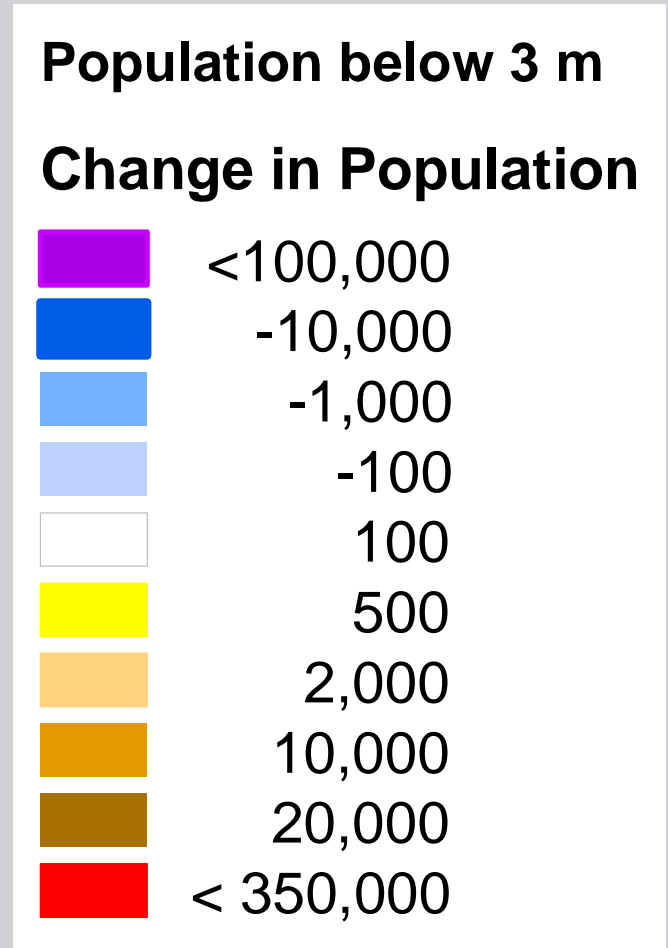
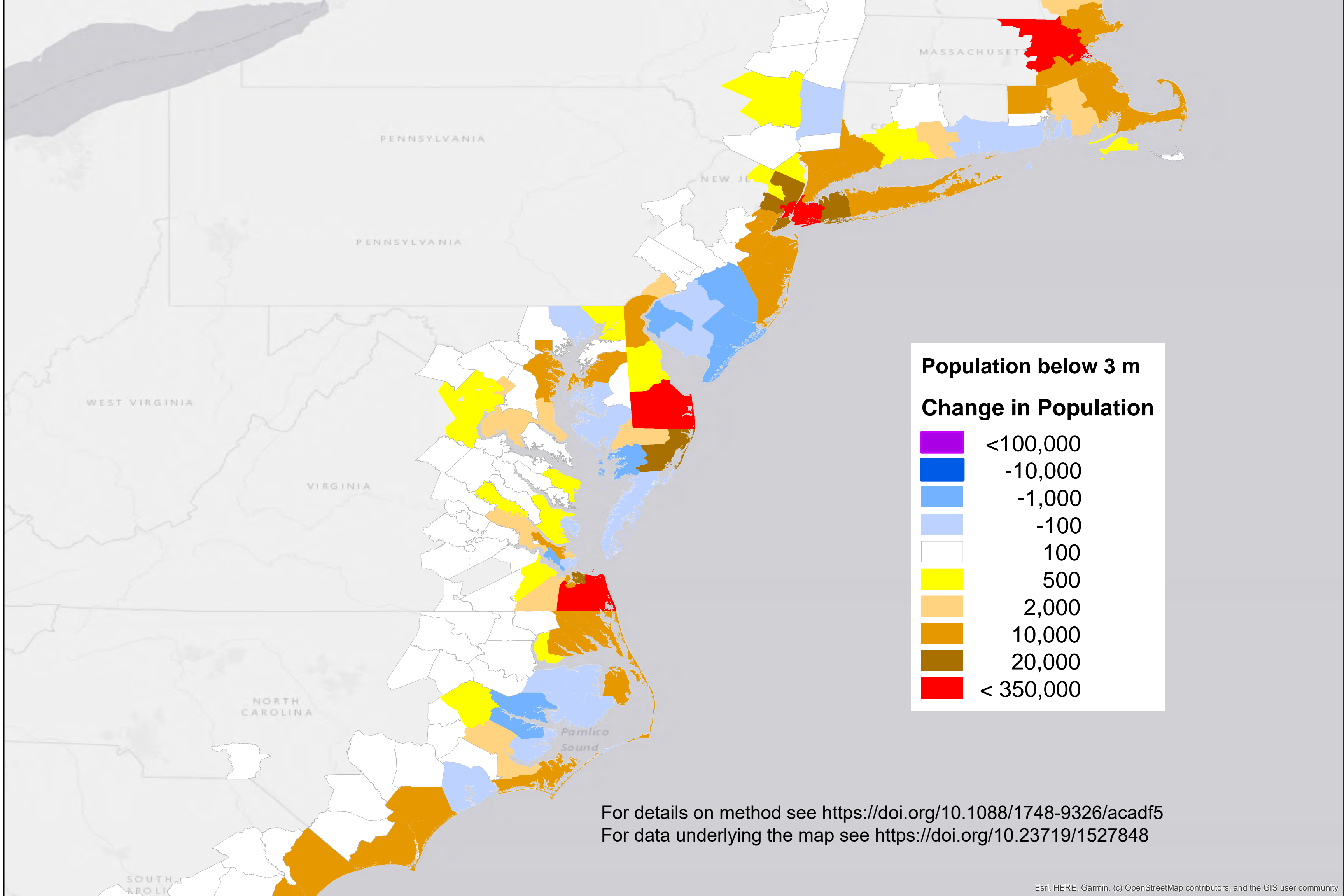


For details on method see <https://doi.org/10.1088/1748-9326/acadf5>
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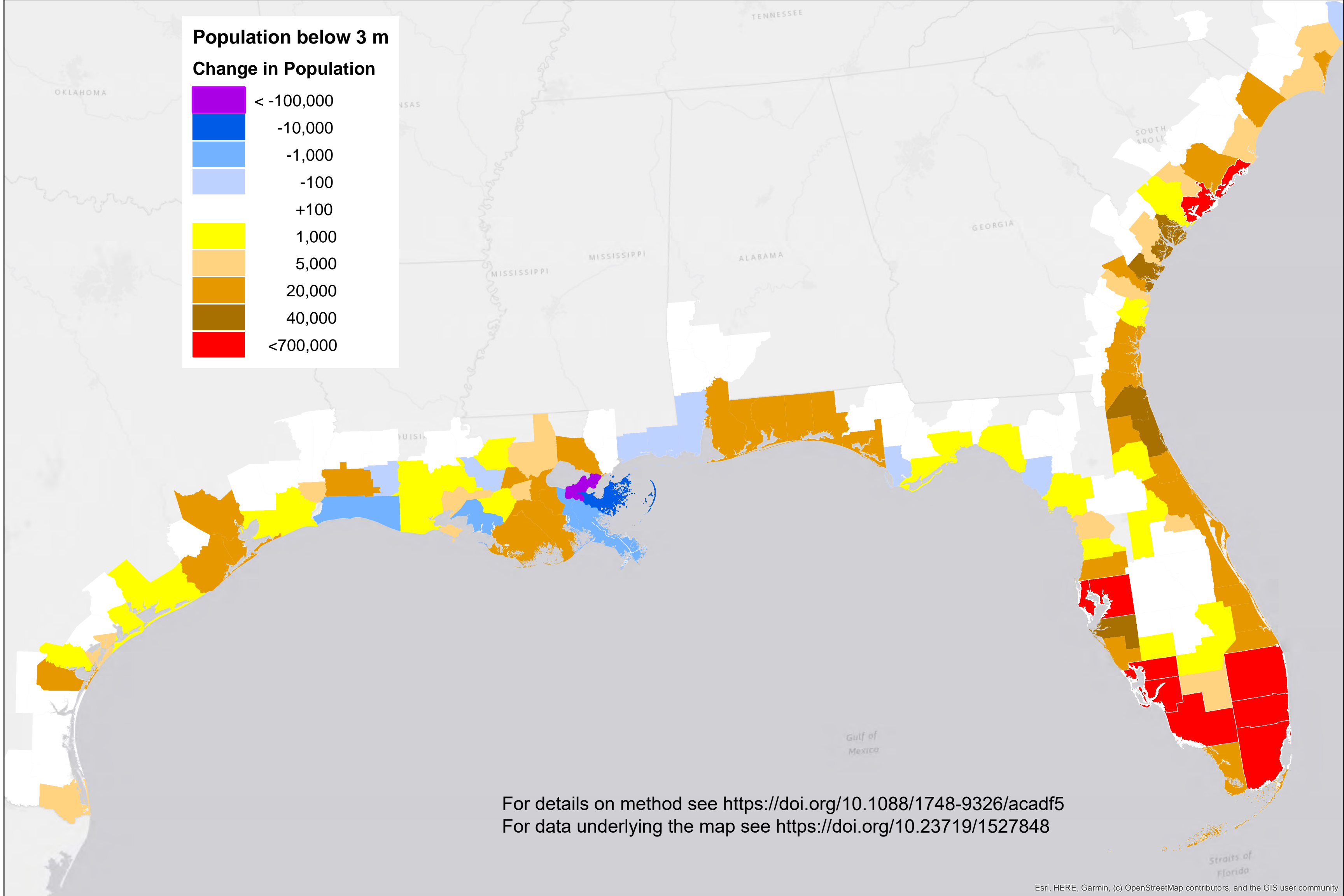


Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

For details on method see <https://doi.org/10.1088/1748-9326/acadf5>
For data underlying the map see <https://doi.org/10.23719/1527848>

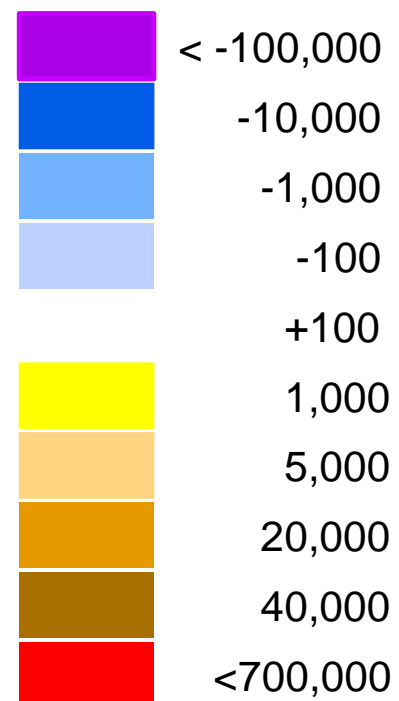


For details on method see <https://doi.org/10.1088/1748-9326/acadf5>
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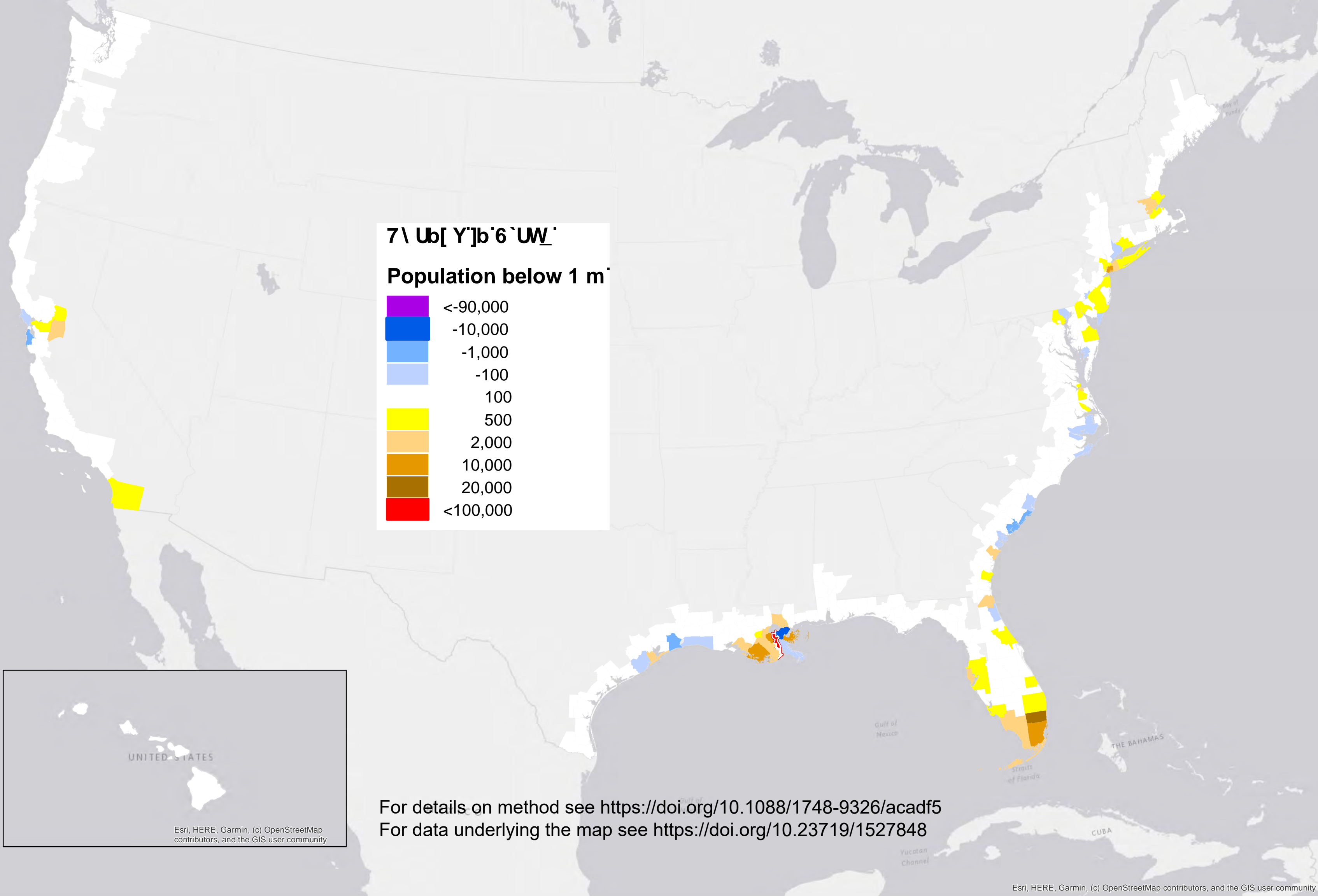


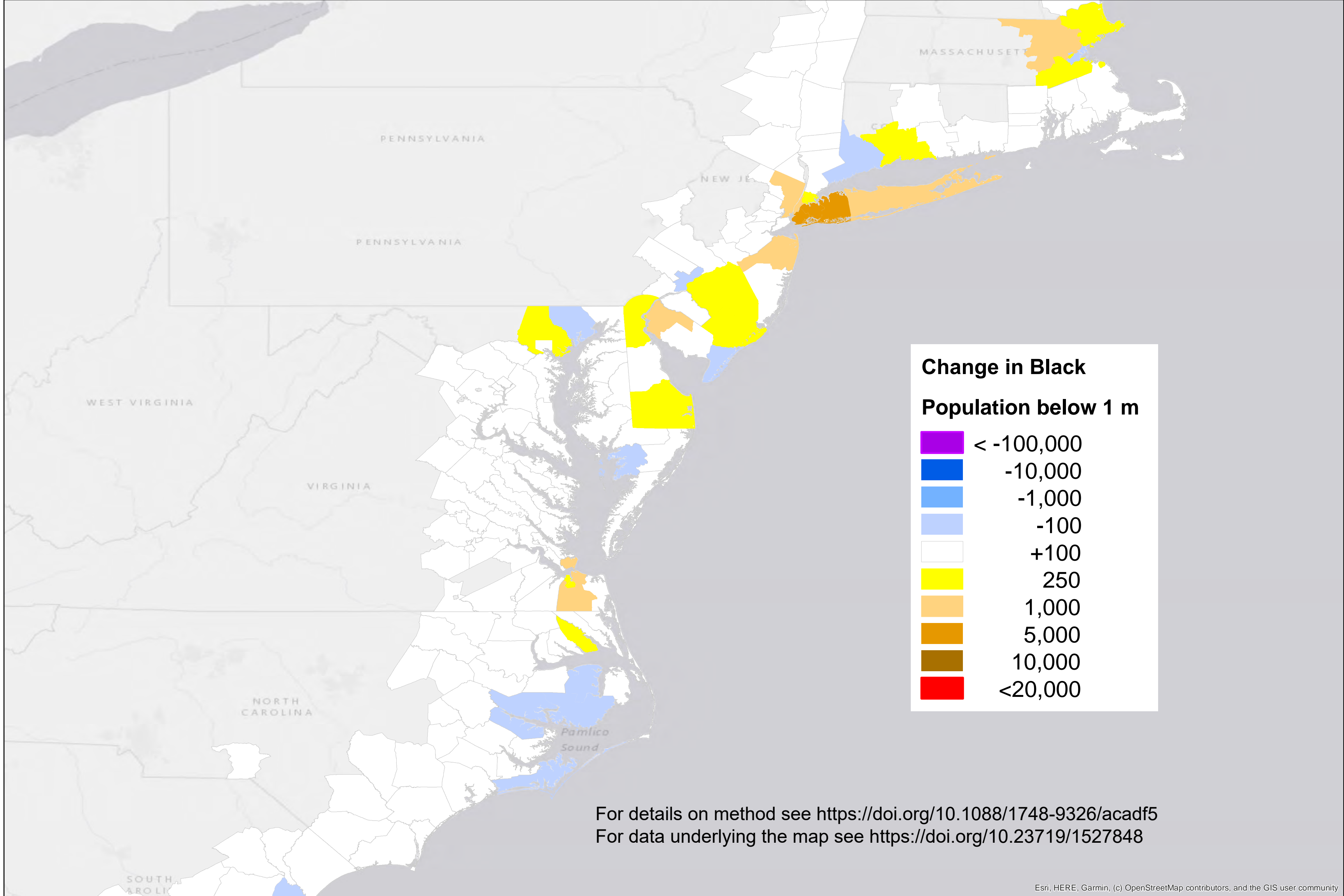
Population below 3 m

Change in Population

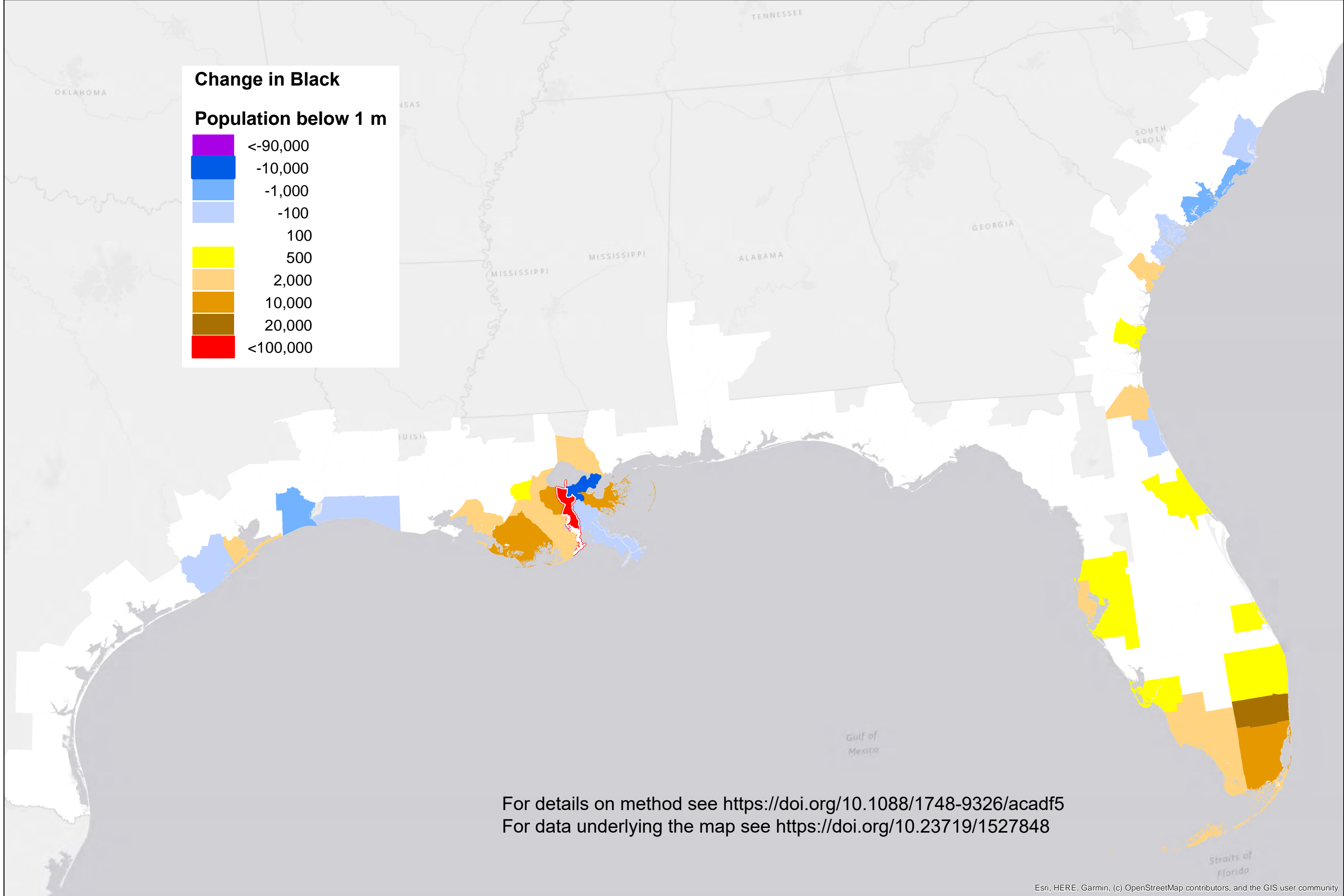


For details on method see <https://doi.org/10.1088/1748-9326/acadf5>
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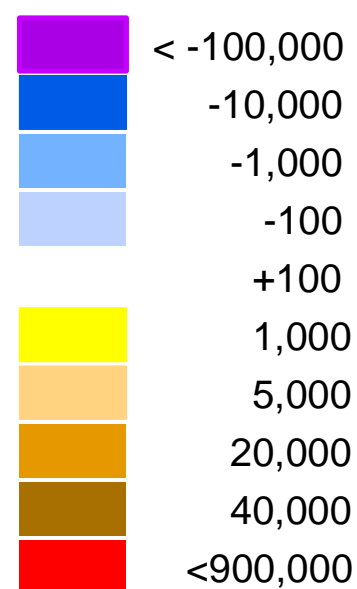




For details on method see <https://doi.org/10.1088/1748-9326/acadf5>
For data underlying the map see <https://doi.org/10.23719/1527848>



**Change in Black
Population below 3m**

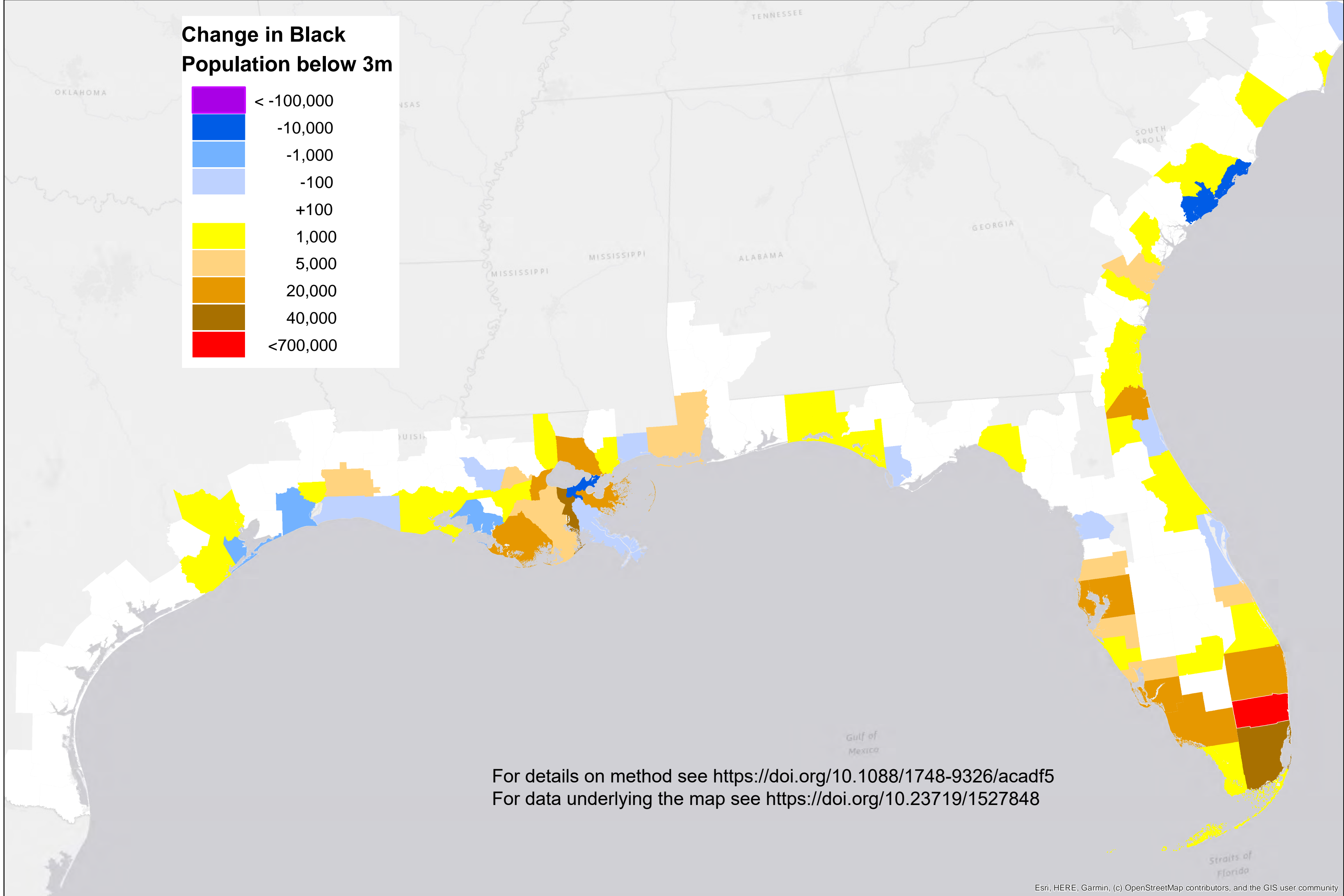
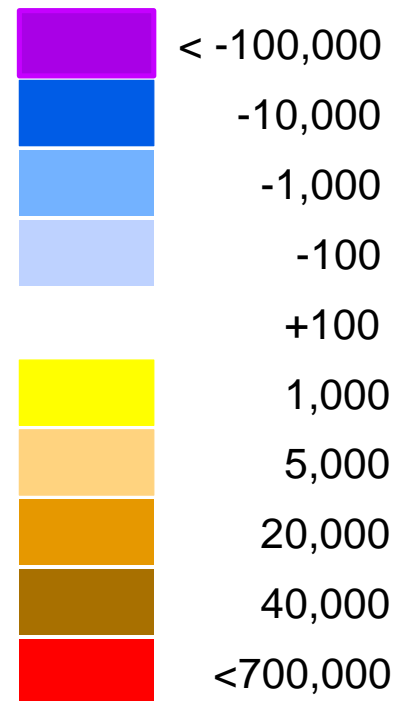


UNITED STATES

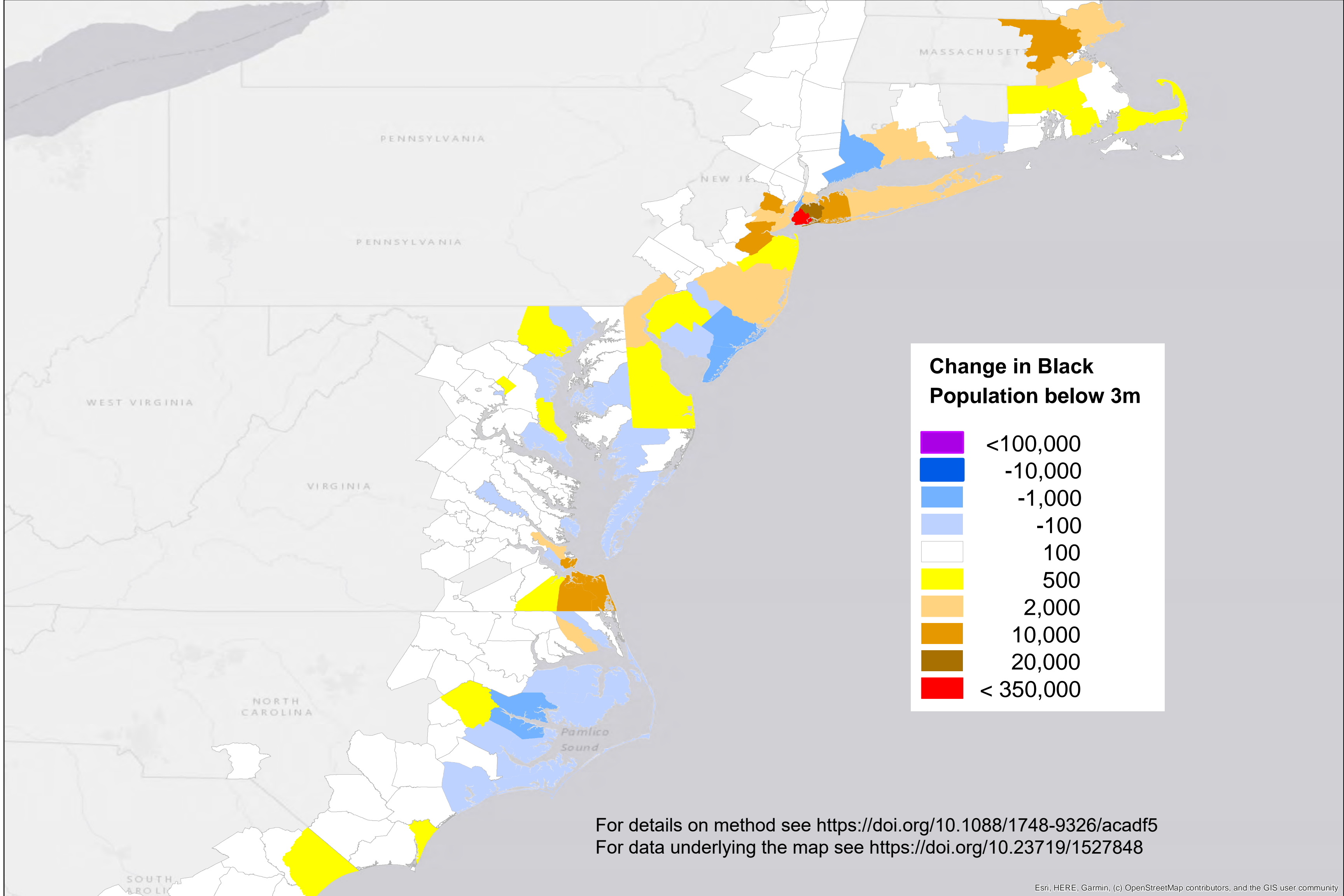
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

For details on method see <https://doi.org/10.1088/1748-9326/acadf5>
For data underlying the map see <https://doi.org/10.23719/1527848>

Change in Black Population below 3m



For details on method see <https://doi.org/10.1088/1748-9326/acadf5>
For data underlying the map see <https://doi.org/10.23719/1527848>



For details on method see <https://doi.org/10.1088/1748-9326/acadf5>
For data underlying the map see <https://doi.org/10.23719/1527848>

**Change in Hispanic
Population below 1 m**



UNITED STATES

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MÉXICO

For details on method see <https://doi.org/10.1088/1748-9326/acadf5>
For data underlying the map see <https://doi.org/10.23719/1527848>

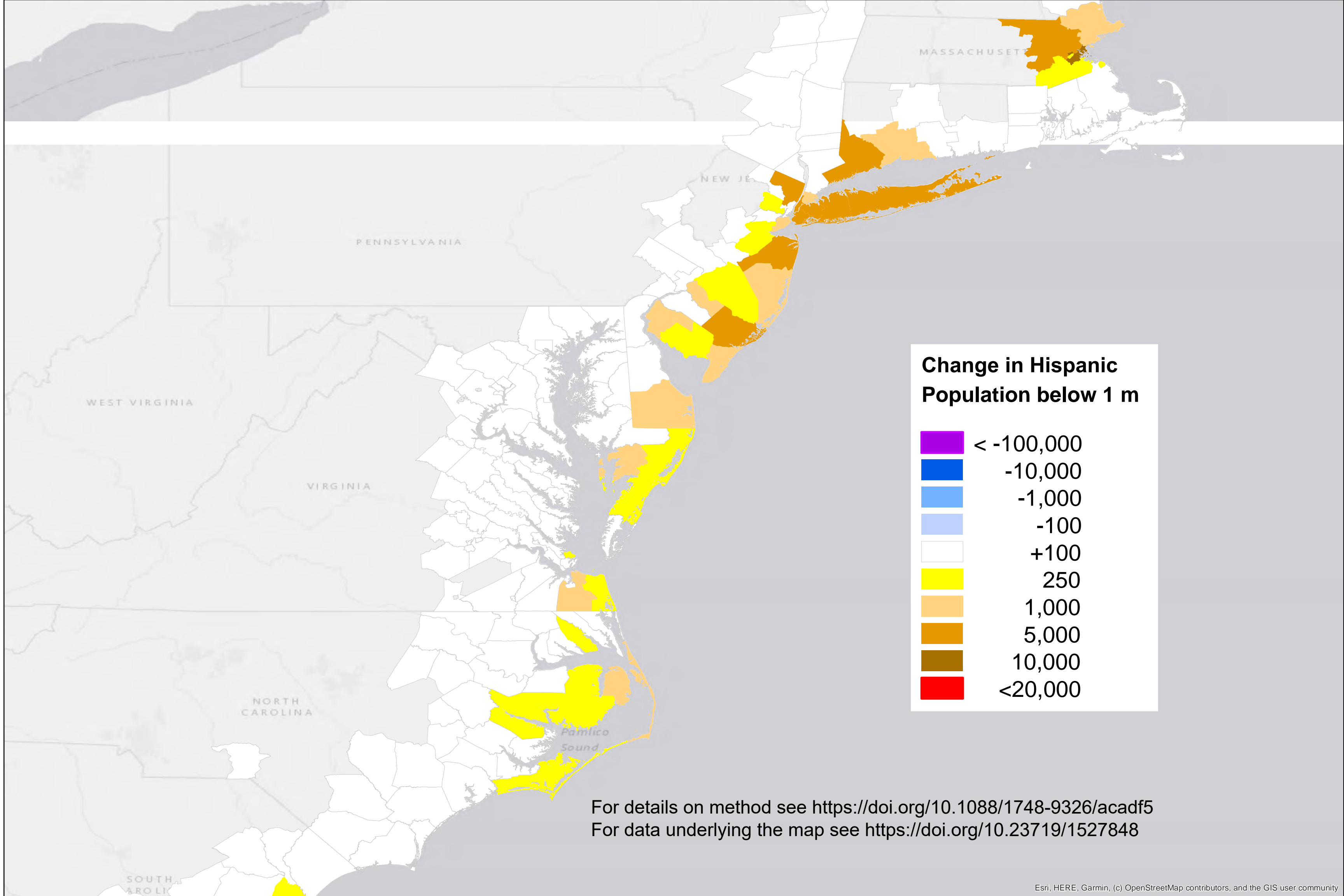
Gulf of Mexico

Straits of Florida

THE BAHAMAS

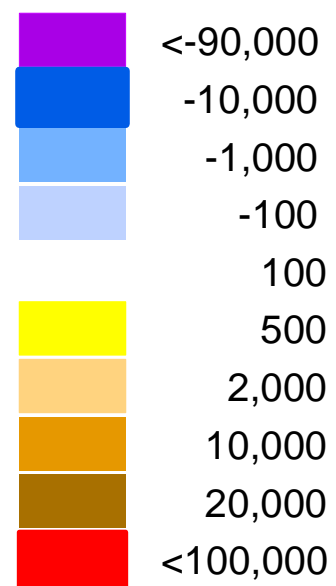
CUBA

Yucatan Channel



For details on method see <https://doi.org/10.1088/1748-9326/acadf5>
For data underlying the map see <https://doi.org/10.23719/1527848>

Change in Hispanic Population below 1 m

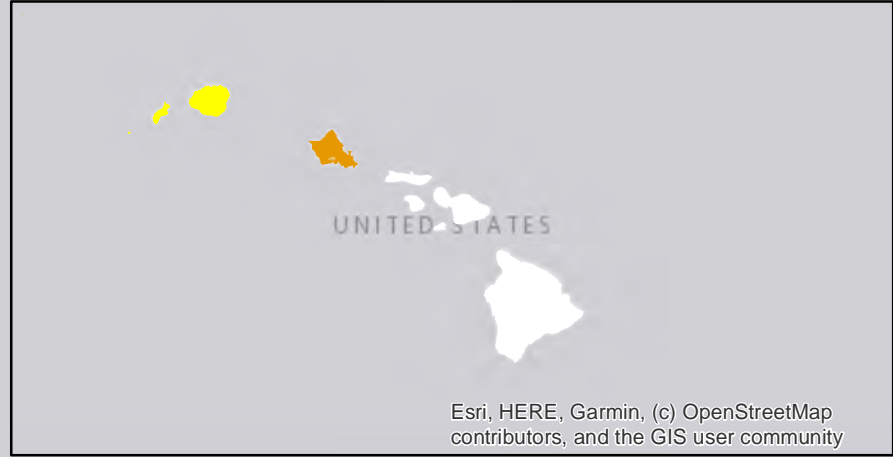
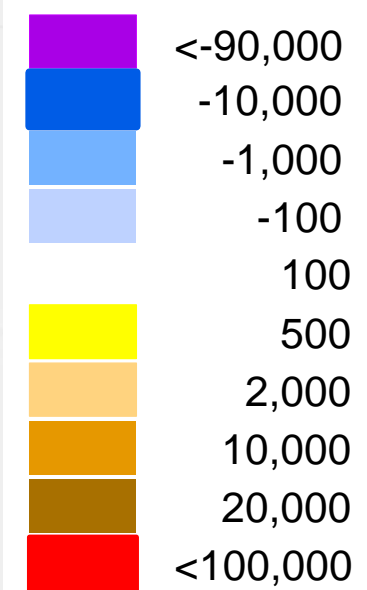


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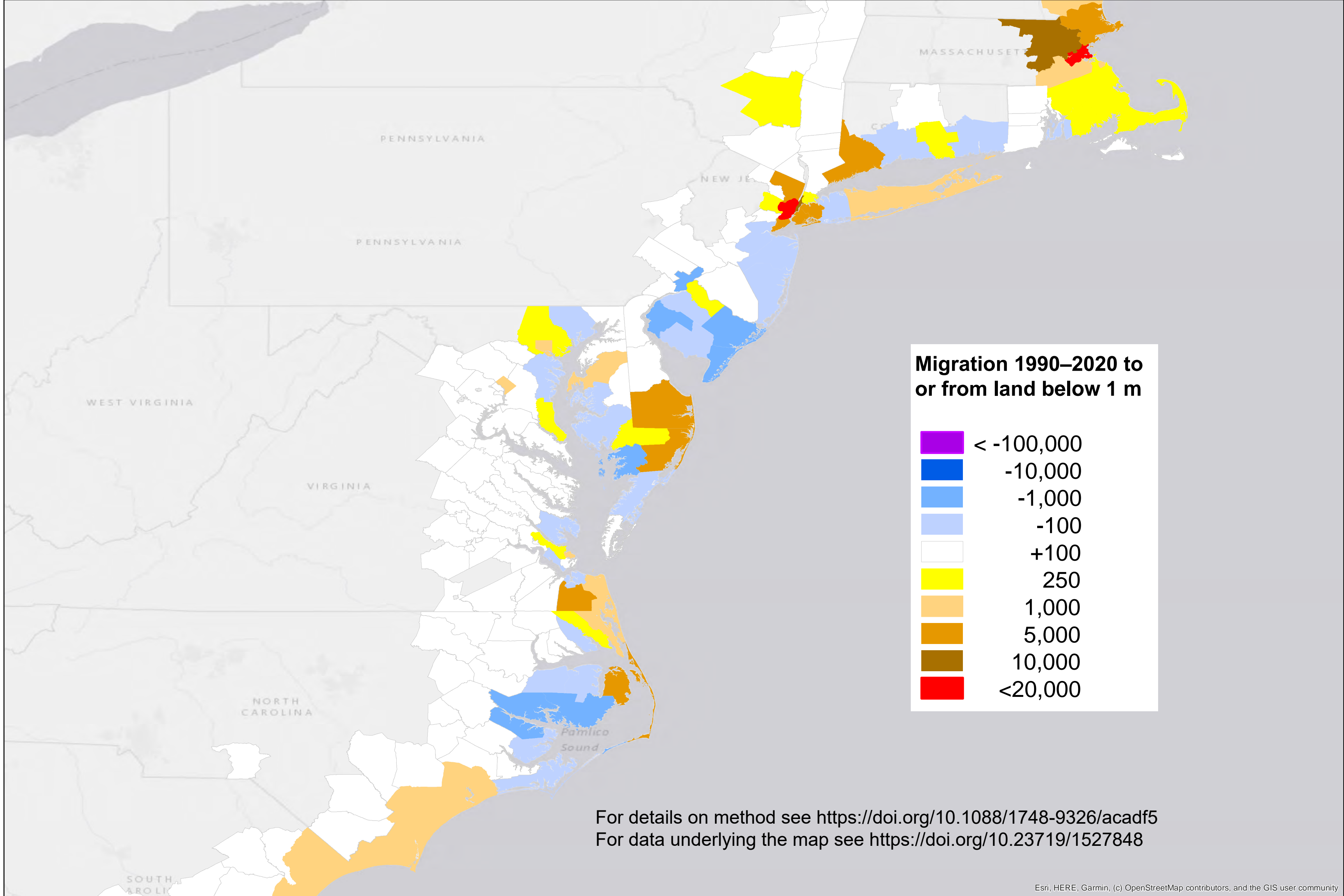
Apparent Migration into and out of Land Vulnerable to Sea Level Rise by County 1990 to 2020

These maps show county-specific estimates of the change in populations less than one meter above the sea level of 2020, as estimated in the paper for which this document provides supplemental maps. The population changes in these maps reflect only the net change from migration, births, and deaths from the land below one meter, and do not include the homes that were more than one meter above sea level in 1990 but less than one meter above sea level by 2020. For further details, see the main paper and the Supplemental Methods associated with this analysis.

**Migration 1990–2020 to
or from land below 1 m**



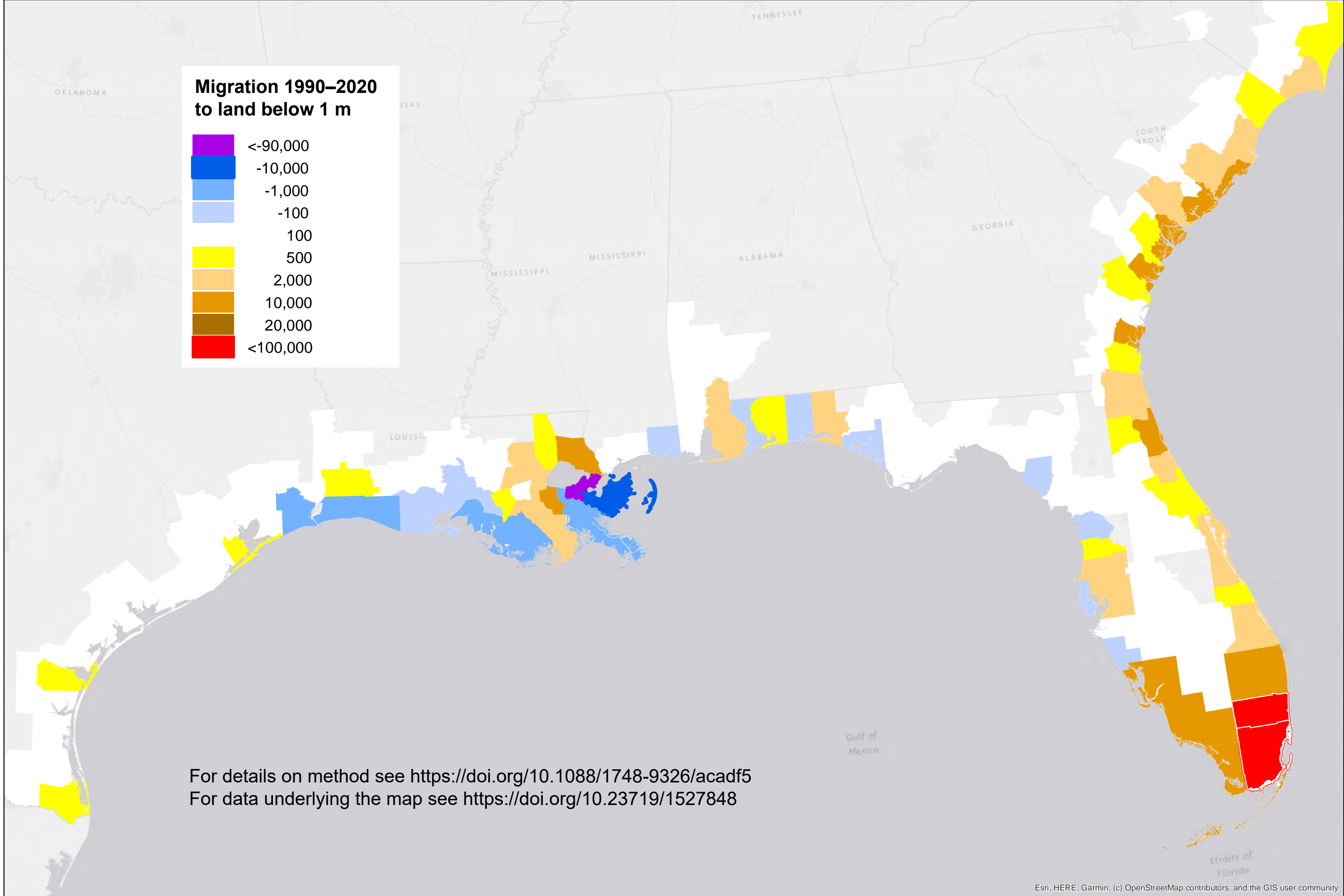
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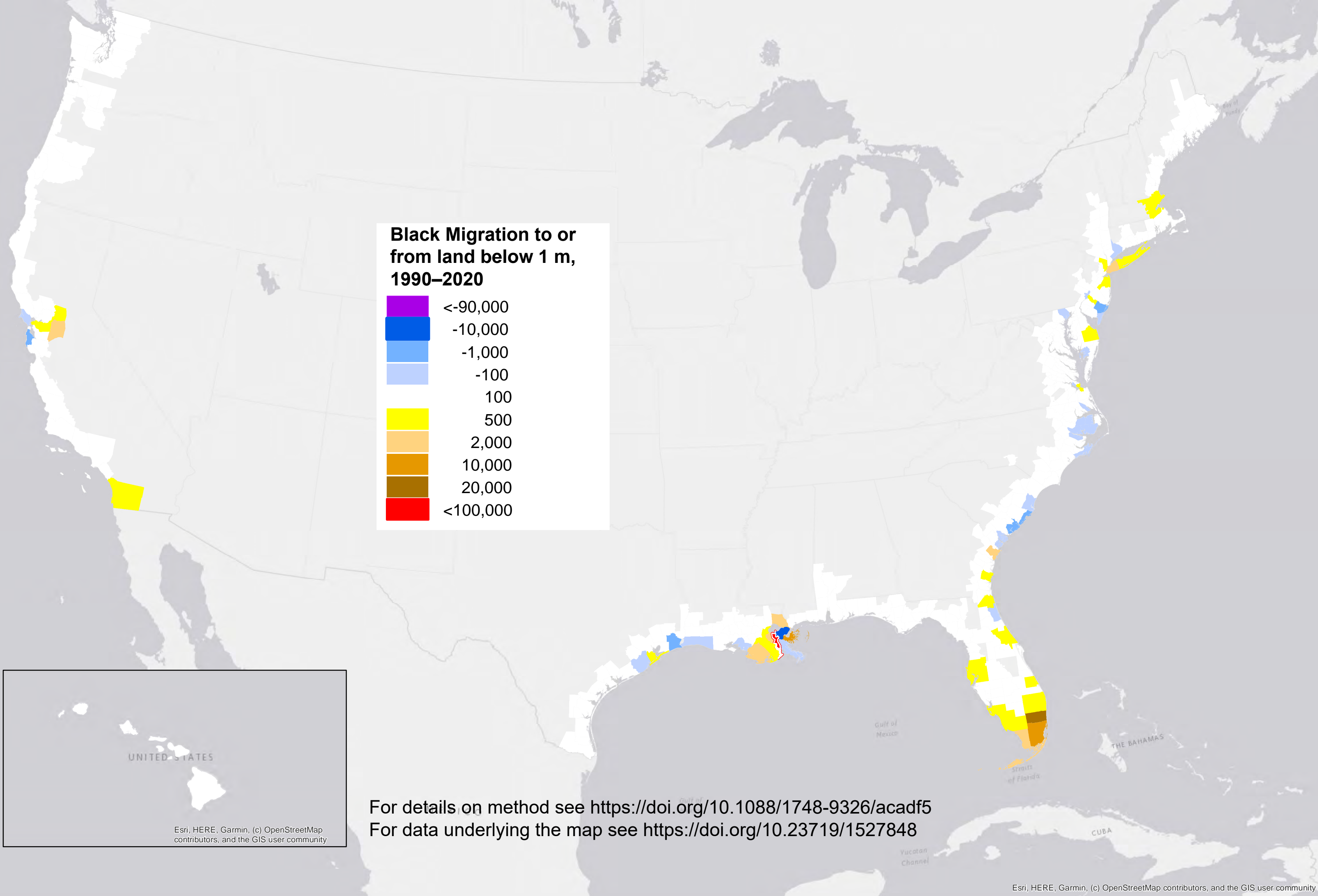


**Migration 1990–2020 to
or from land below 1 m**

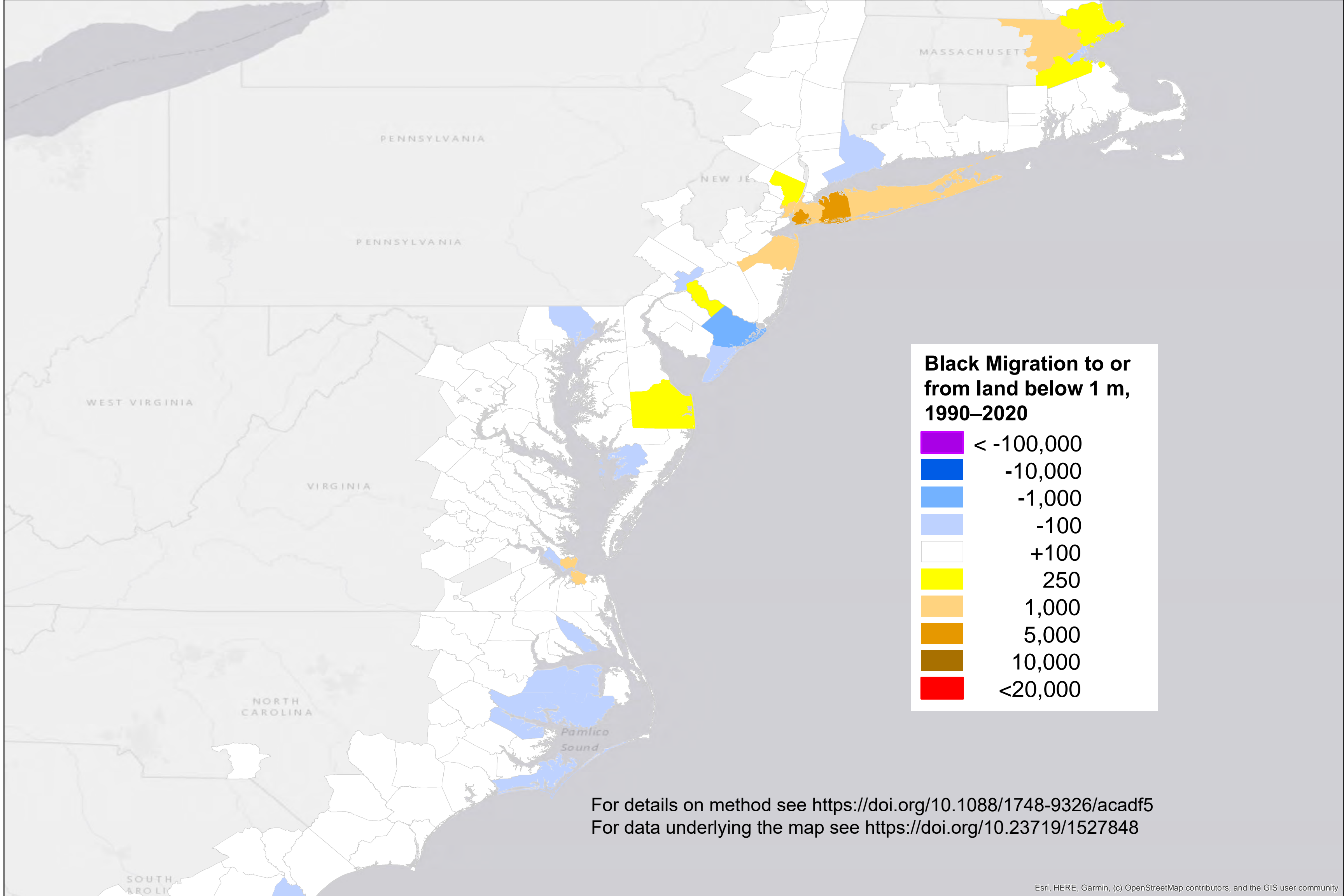


For details on method see <https://doi.org/10.1088/1748-9326/acadf5>
For data underlying the map see <https://doi.org/10.23719/1527848>





For details on method see <https://doi.org/10.1088/1748-9326/acadf5>
For data underlying the map see <https://doi.org/10.23719/1527848>

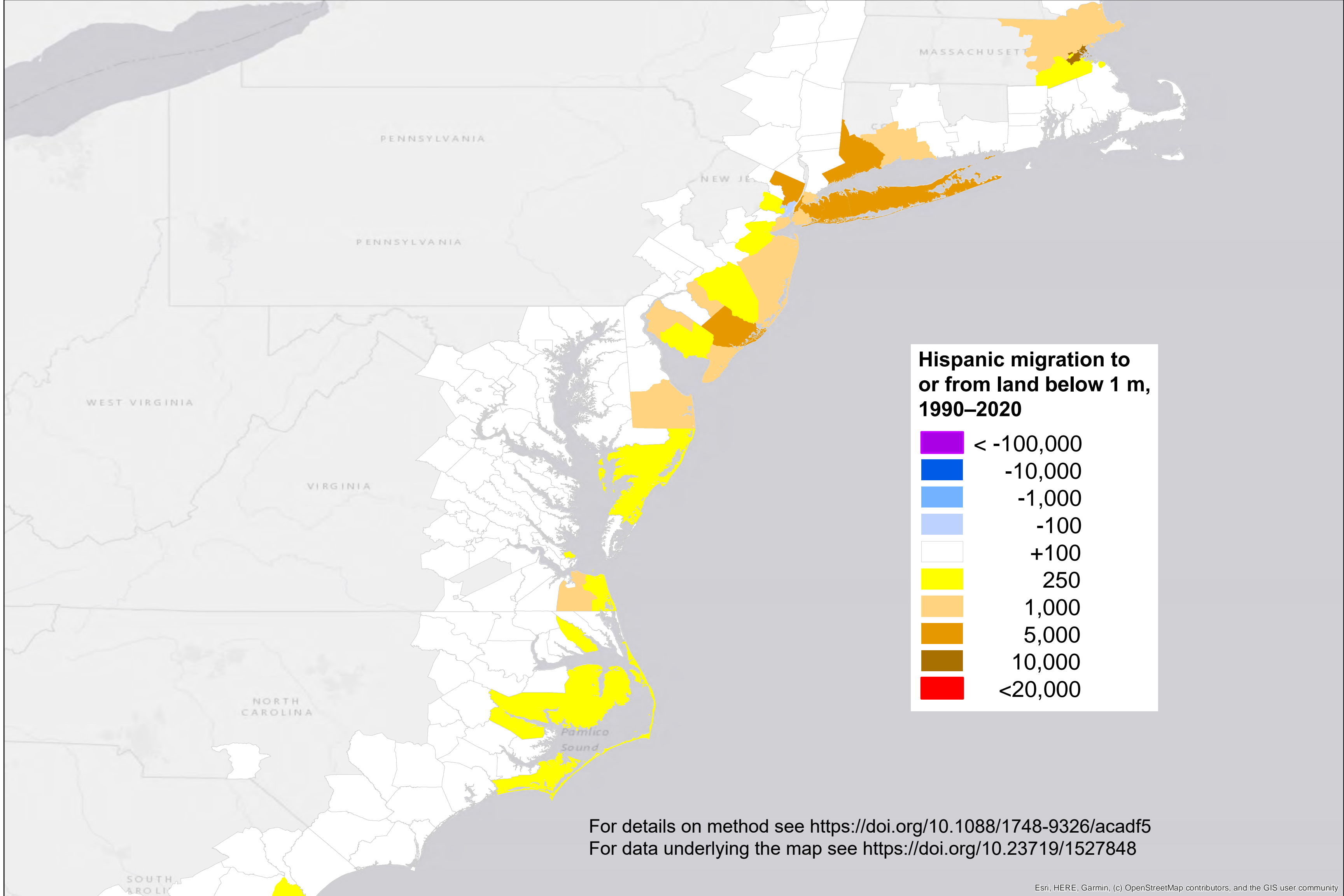


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For data underlying the map see <https://doi.org/10.23719/1527848>

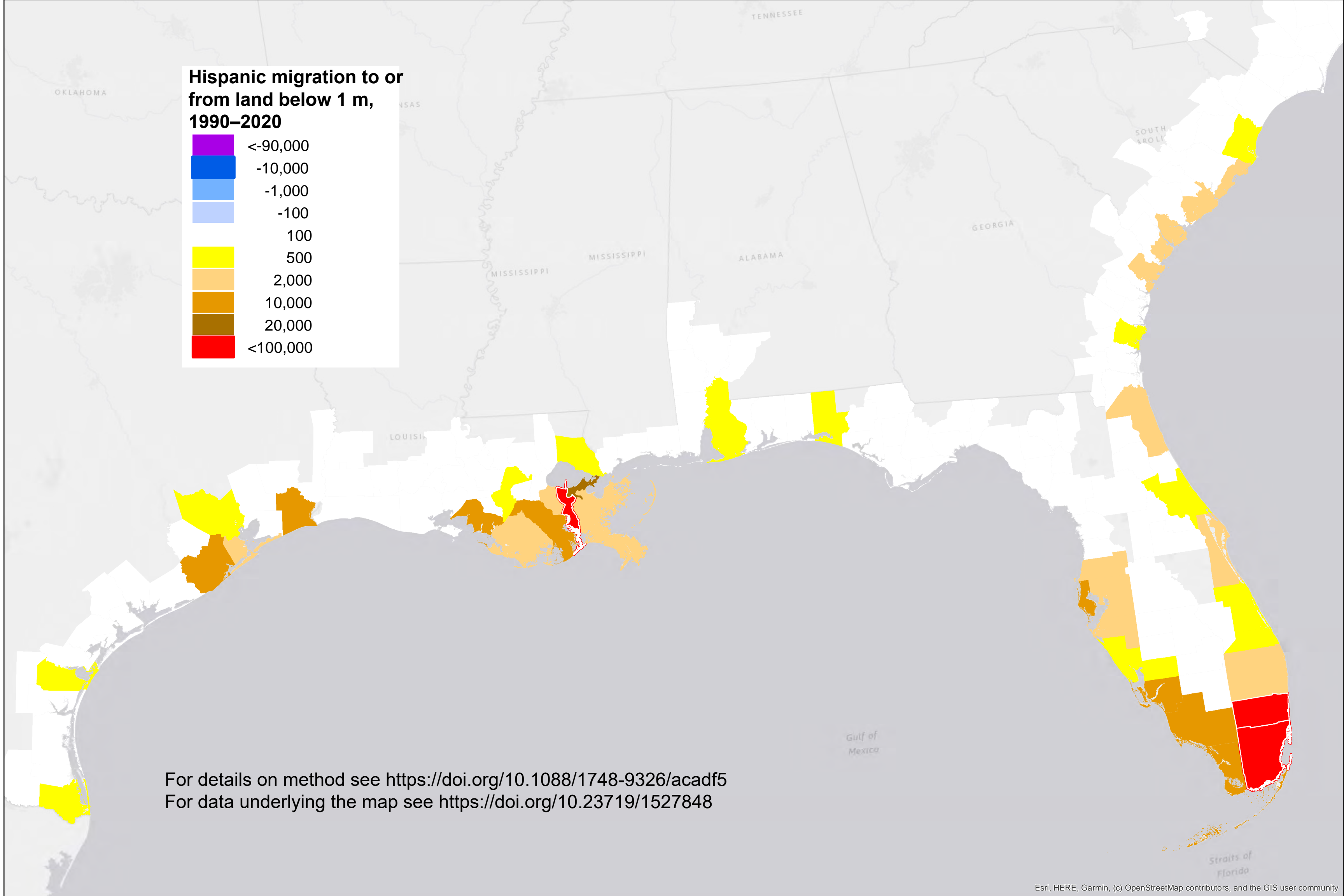
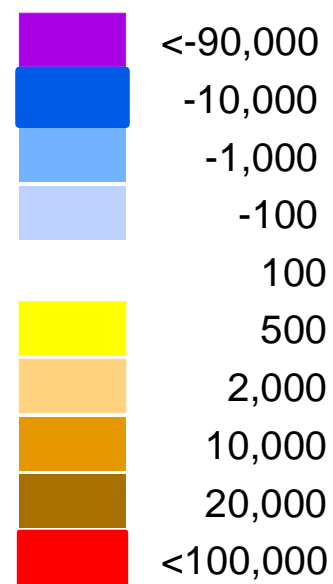
**Black Migration to or
from land below 1 m,
1990–2020**



For details on method see <https://doi.org/10.1088/1748-9326/acadf5>
For data underlying the map see <https://doi.org/10.23719/1527848>



Hispanic migration to or from land below 1 m, 1990–2020

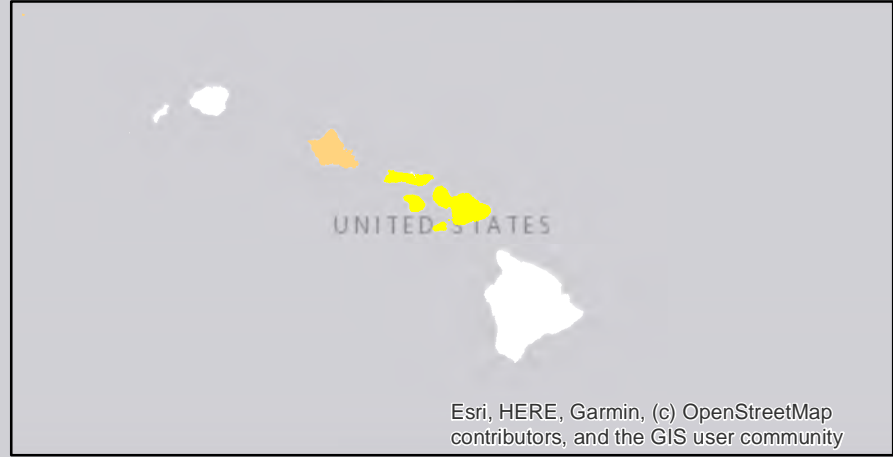
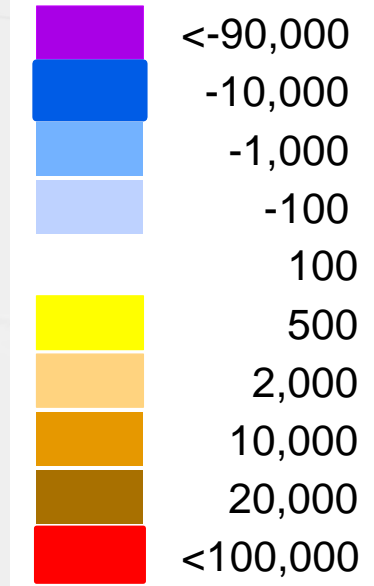


For details on method see <https://doi.org/10.1088/1748-9326/acadf5>
 For data underlying the map see <https://doi.org/10.23719/1527848>

Change in Population Below One Meter by County Caused Solely By Sea Level Rise 1990 to 2020

These maps show county-specific estimates of the change in populations within one meter above sea level due solely to the effect of sea level rise, as estimated in the paper for which this document provides supplemental maps. The population changes in these maps area all based on the 2020 Census and thus do not reflect the changes from migration, births, and deaths; they only include the population of homes that were less than one meter above sea level by 2020, but are above the level the sea had reached by 1990. For further details, see the main paper and the Supplemental Methods associated with this analysis.

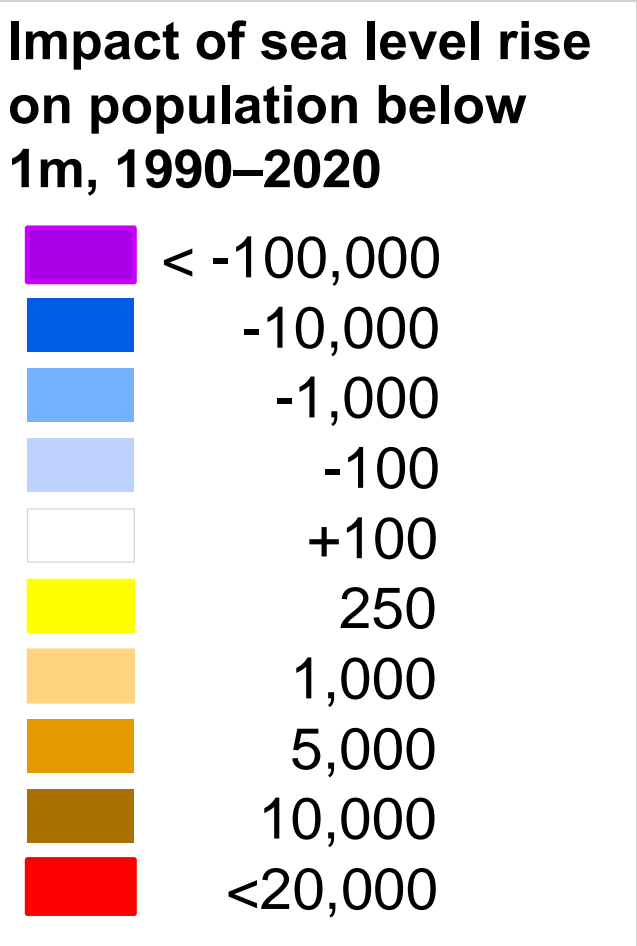
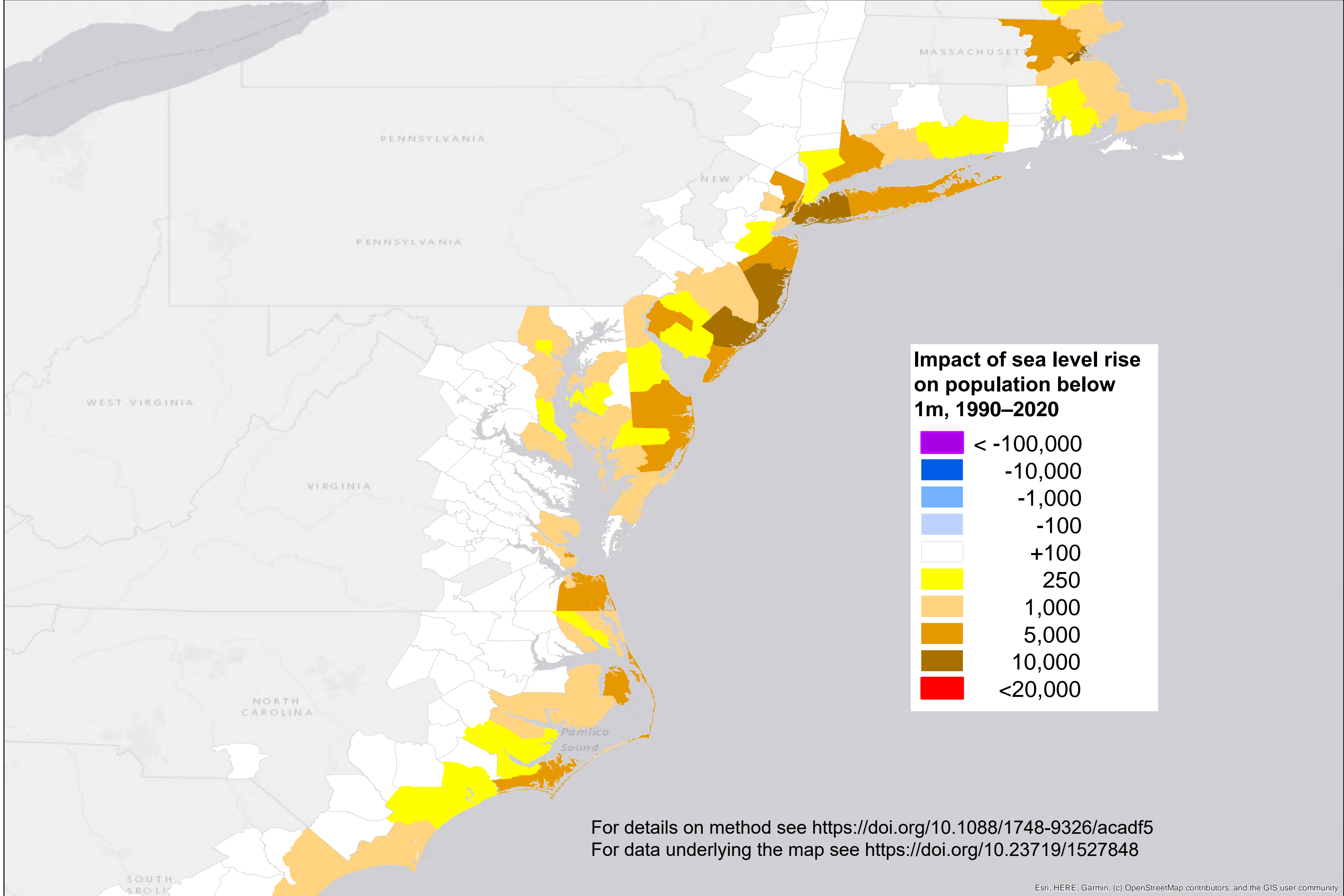
**Impact of Sea Level Rise
on Population below 1 m,
1990–2020**



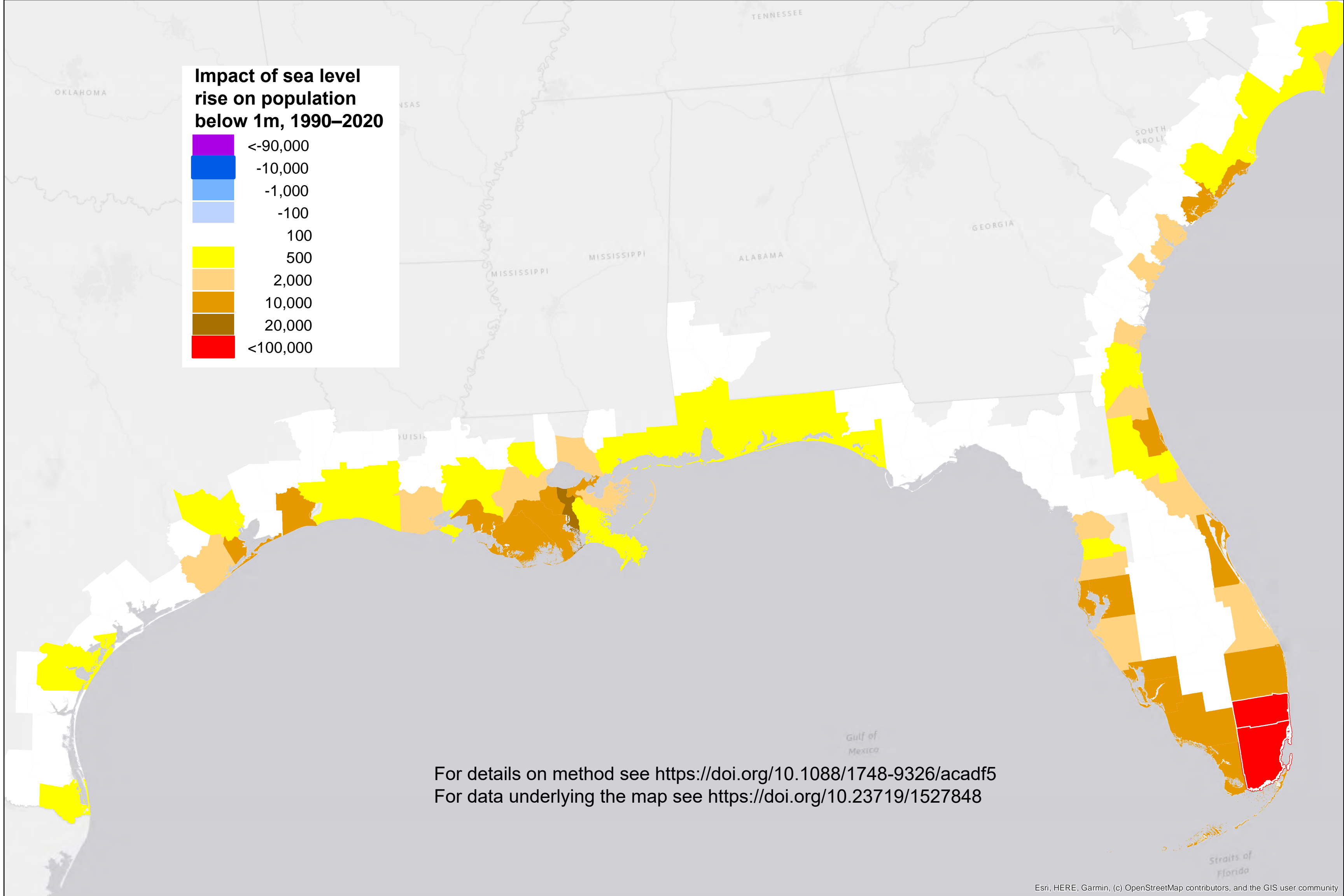
MÉXICO

For details on method see <https://doi.org/10.1088/1748-9326/acadf5>

For data underlying the map see <https://doi.org/10.23719/1527848>

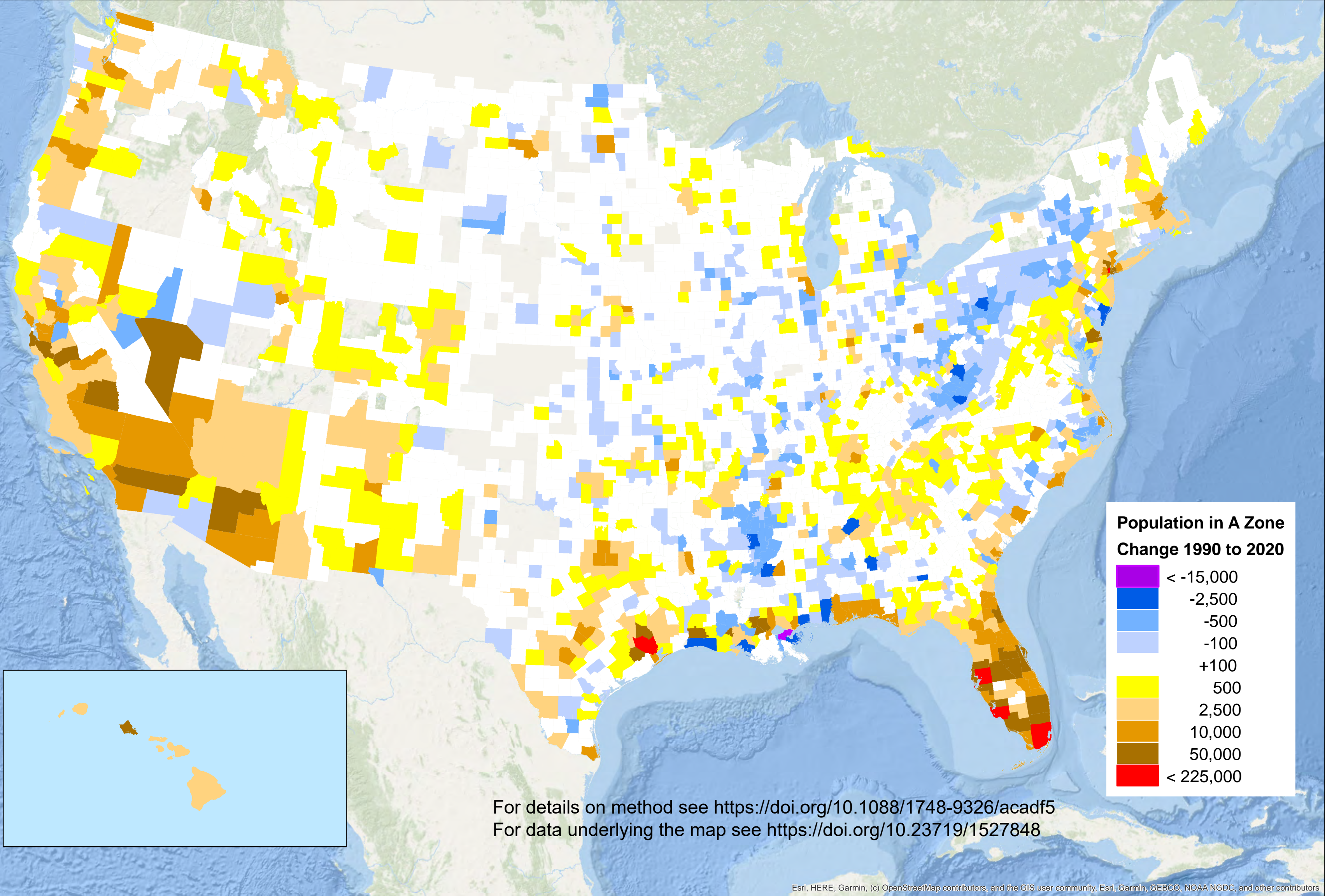


For details on method see <https://doi.org/10.1088/1748-9326/acadf5>
For data underlying the map see <https://doi.org/10.23719/1527848>

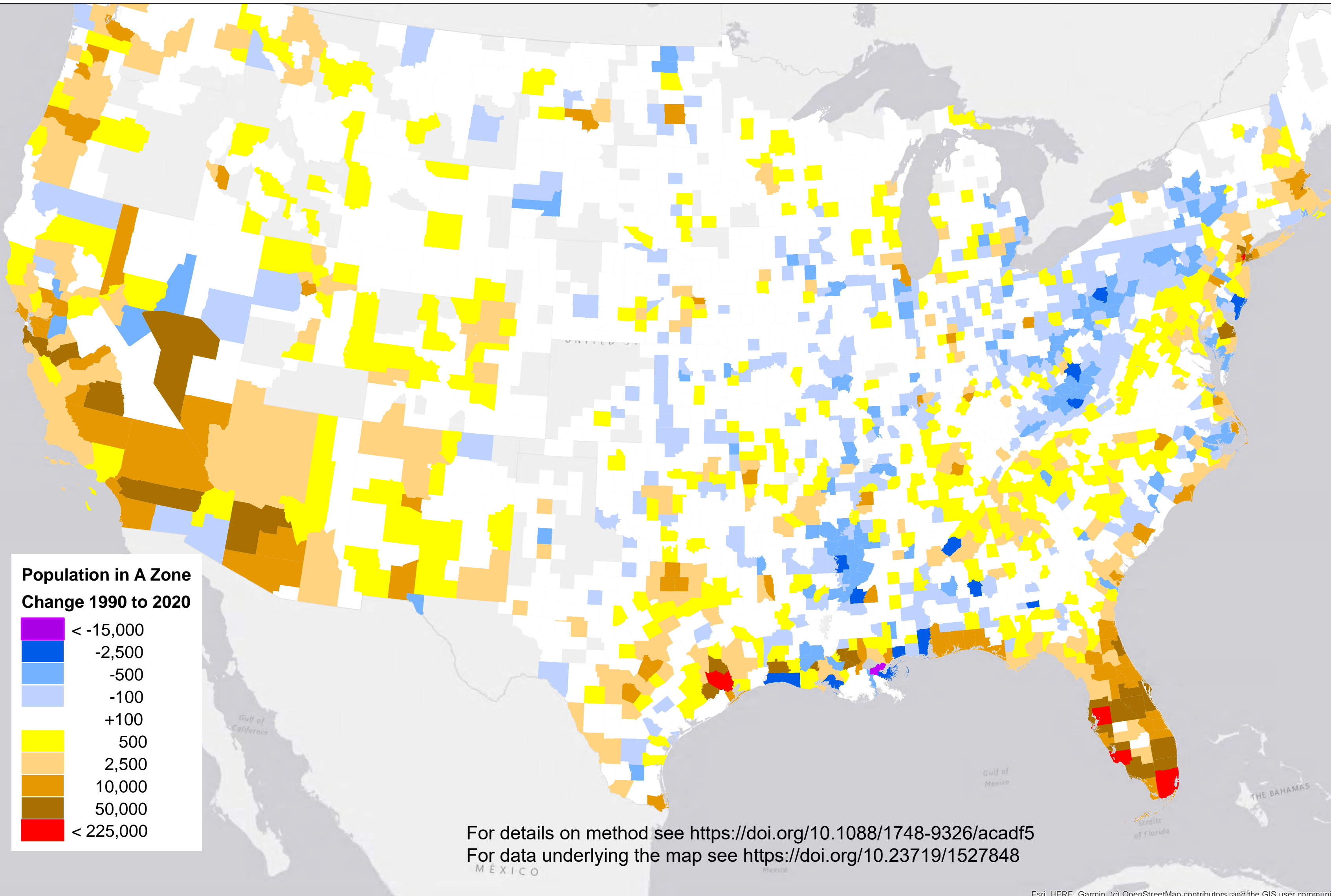


Change in Floodplain Population by County

These maps show county-specific estimates of the change in populations in 100-year (A zone) and 500-year (X500 zone) floodplains, as defined and estimated in the paper for which this document provides supplemental maps. Because the mapped flood zone boundaries did not change, the population changes reflect the net change of migration, births, and deaths. For further details see the Supplemental Methods section associated with this analysis. Maps that differentiate riverine and storm surge flooding are available on request.



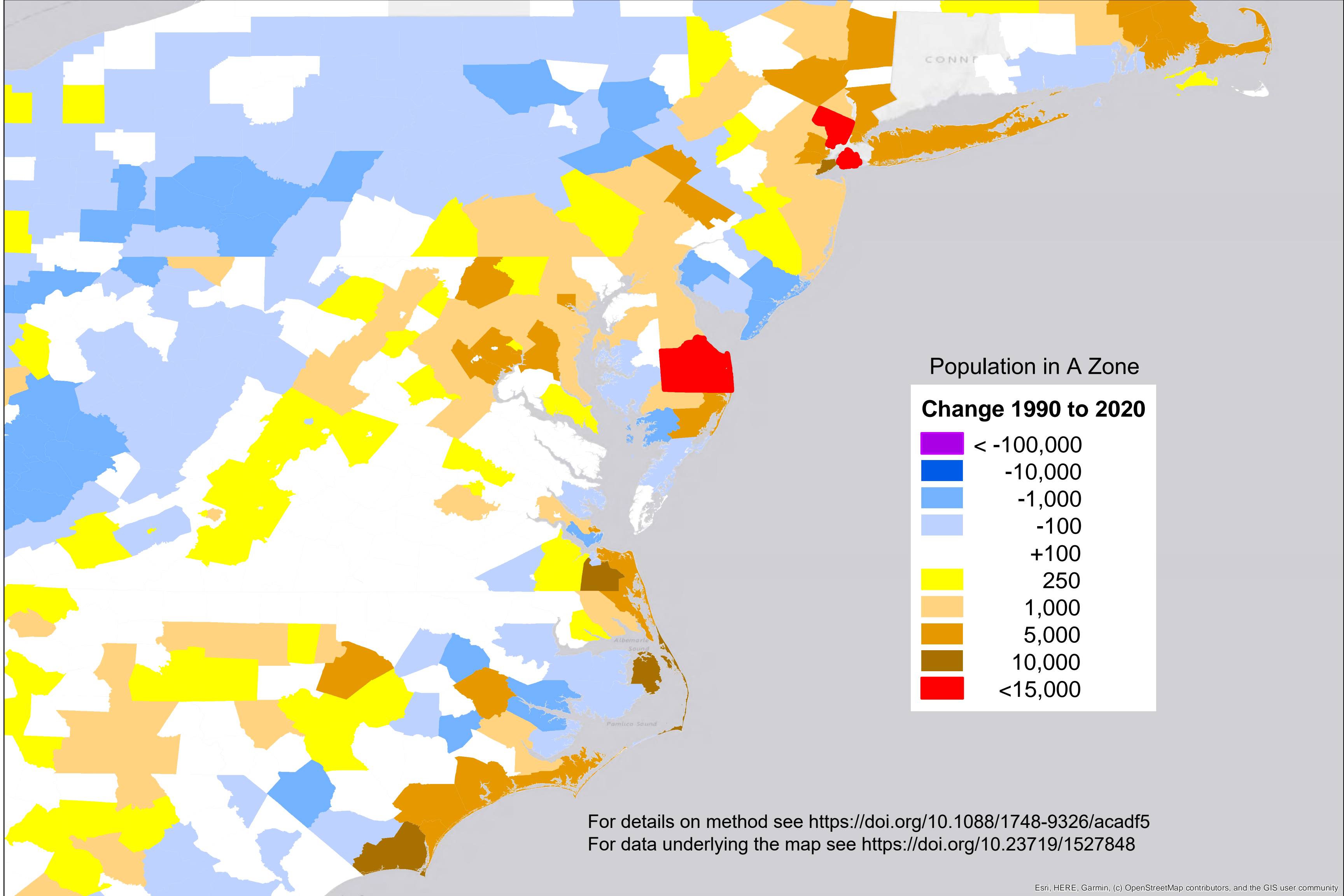
For details on method see <https://doi.org/10.1088/1748-9326/acadf5>
For data underlying the map see <https://doi.org/10.23719/1527848>



**Population in A Zone
Change 1990 to 2020**

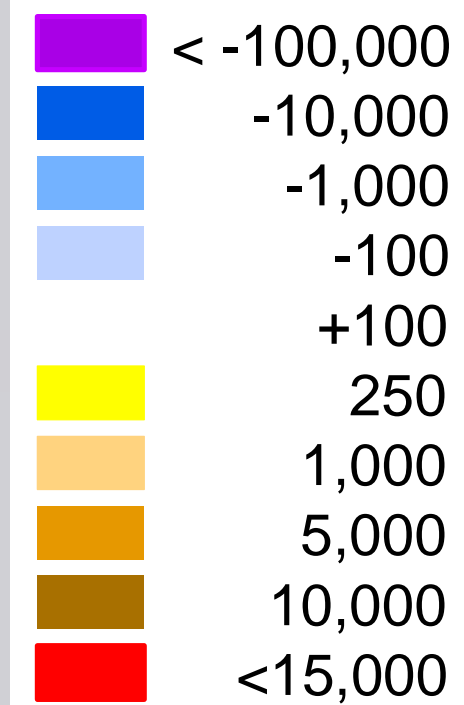
- < -15,000
- 2,500
- 500
- 100
- +100
- 500
- 2,500
- 10,000
- 50,000
- < 225,000

For details on method see <https://doi.org/10.1088/1748-9326/acadf5>
For data underlying the map see <https://doi.org/10.23719/1527848>

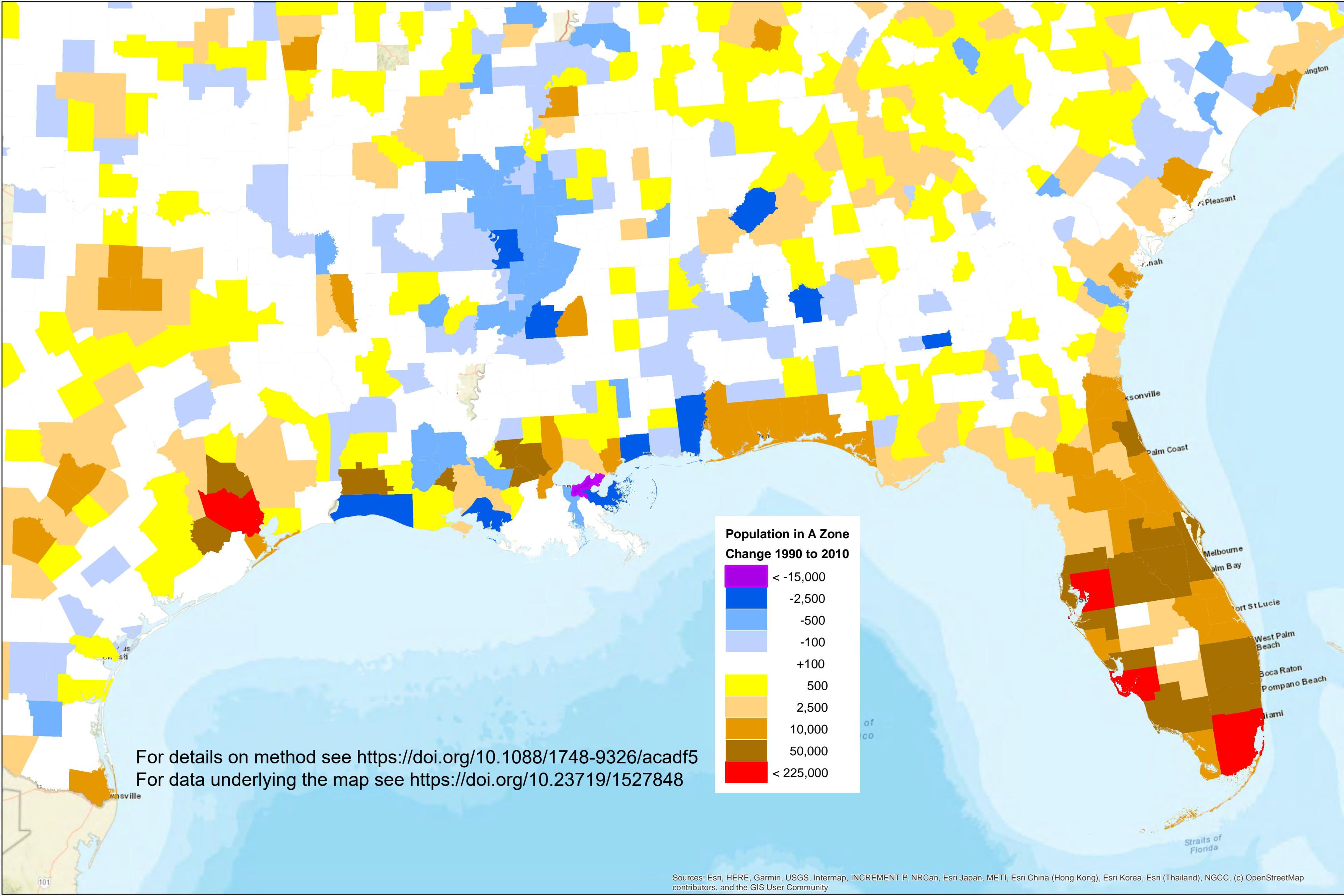


Population in A Zone

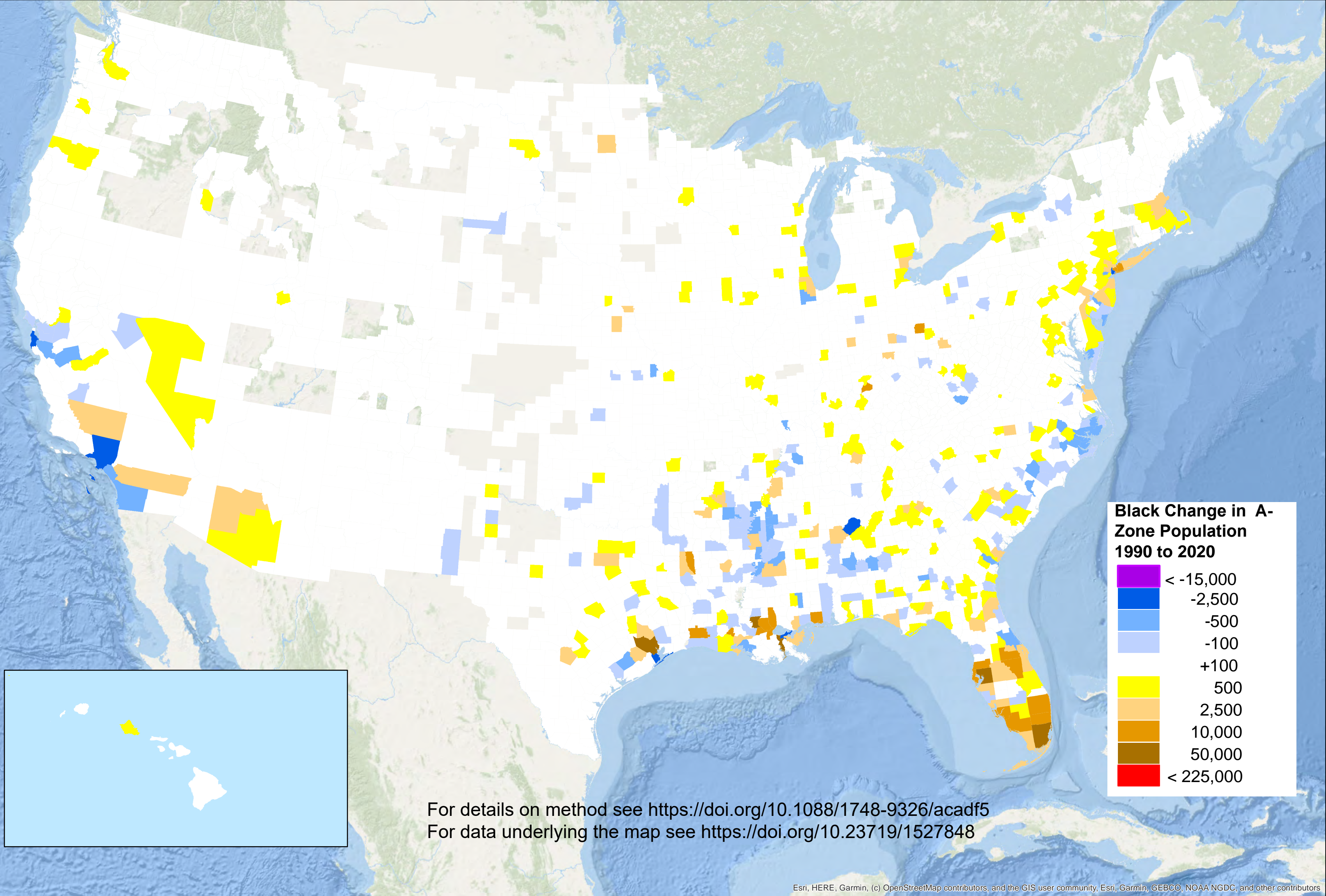
Change 1990 to 2020



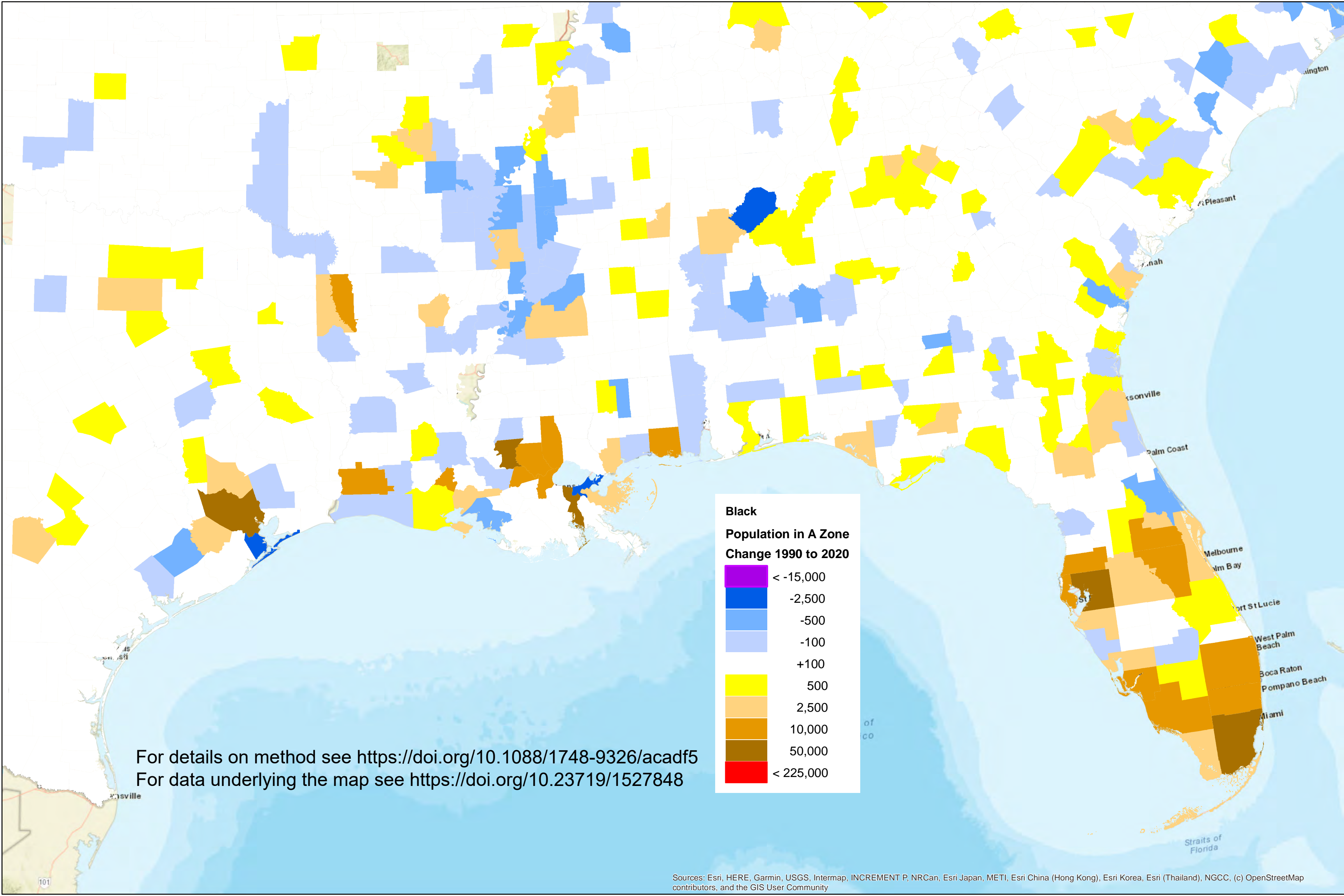
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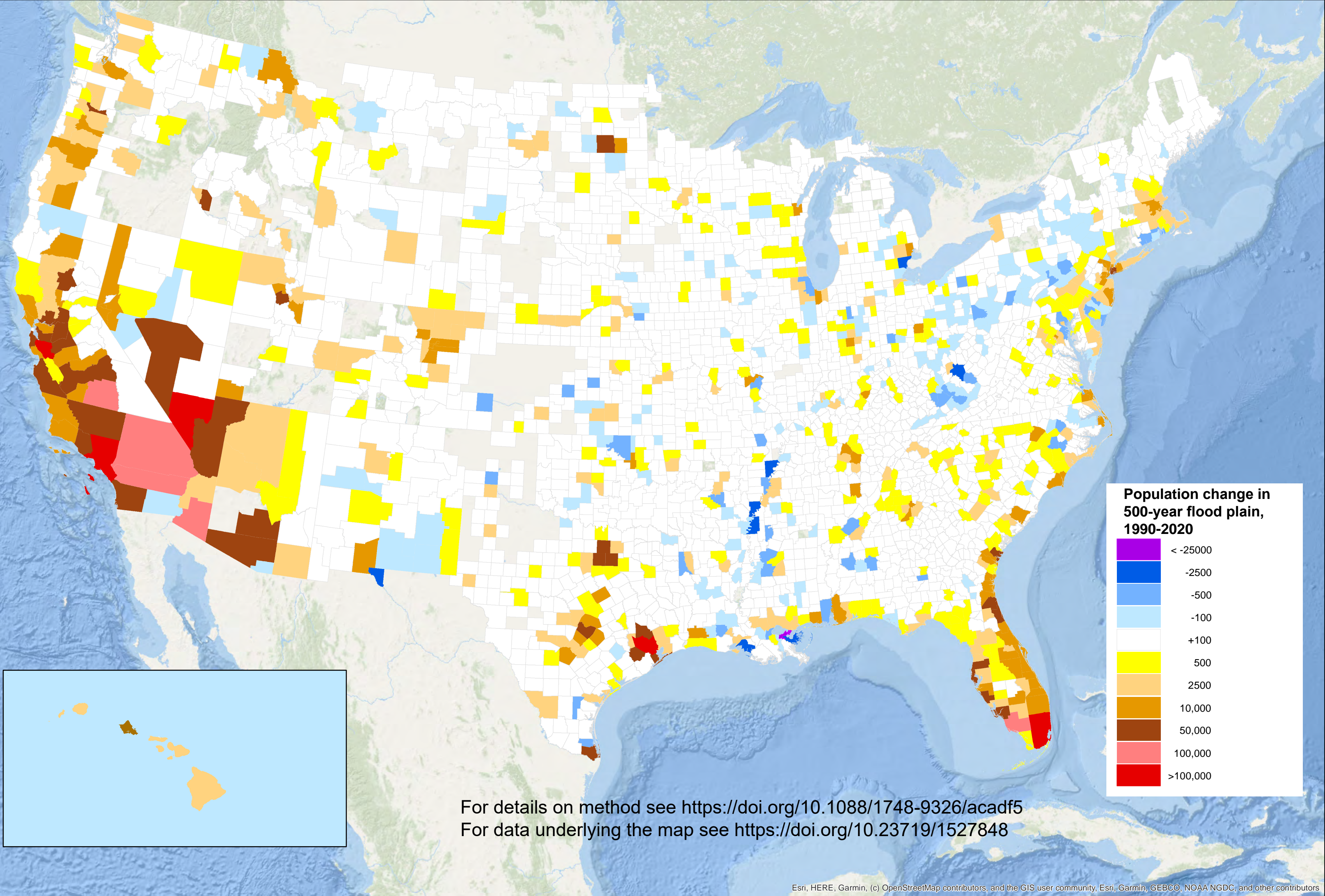
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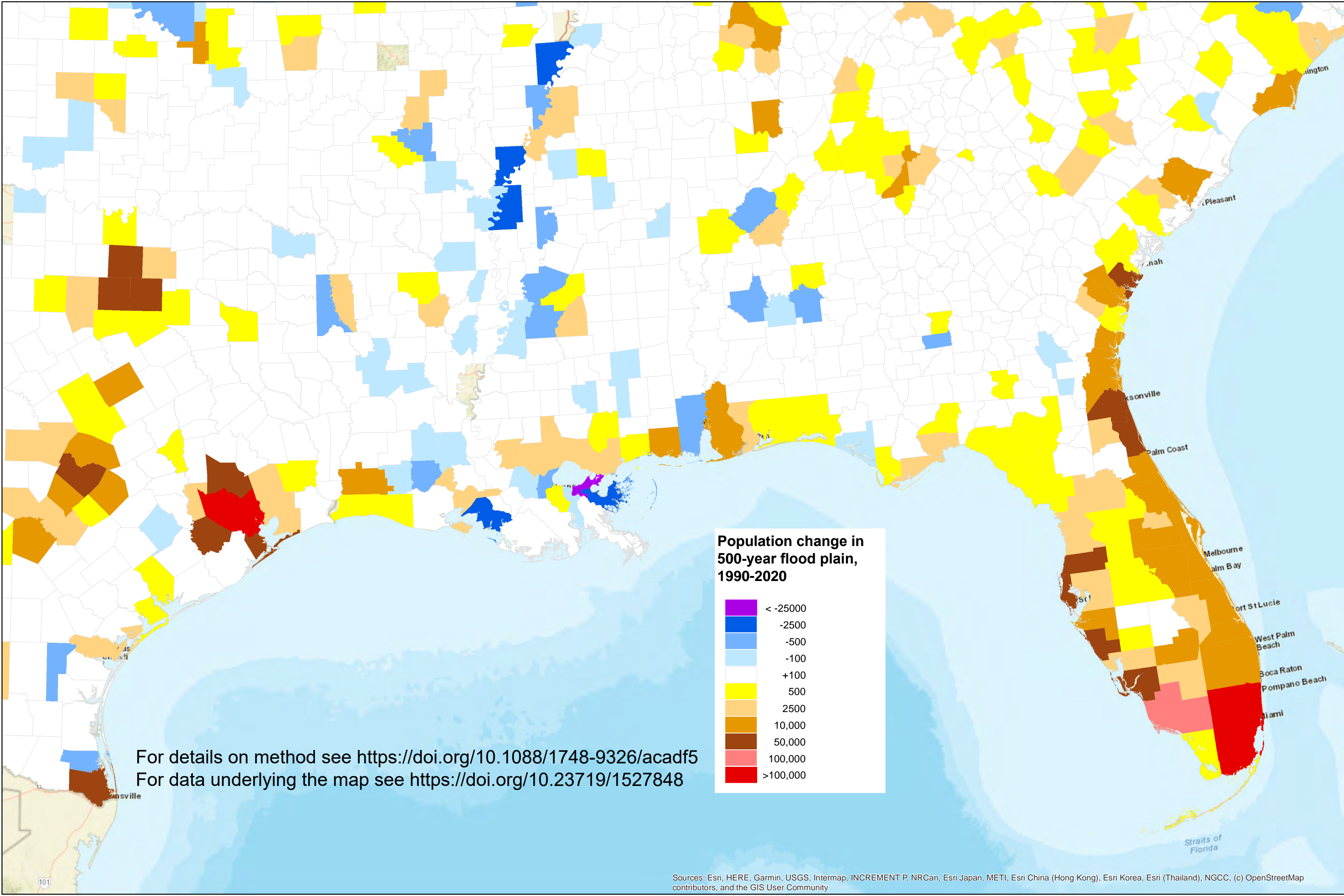
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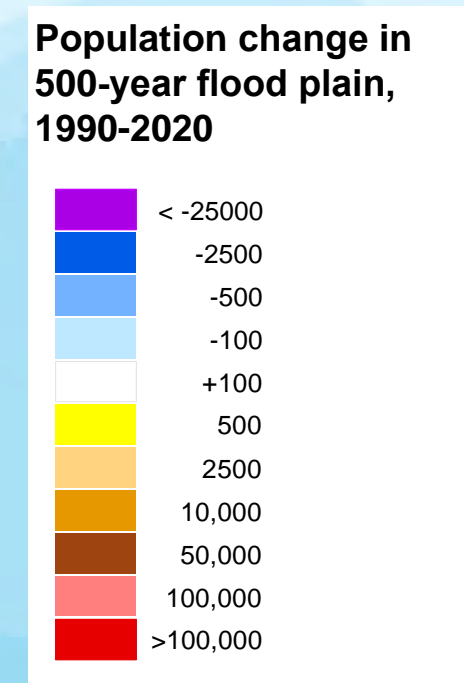
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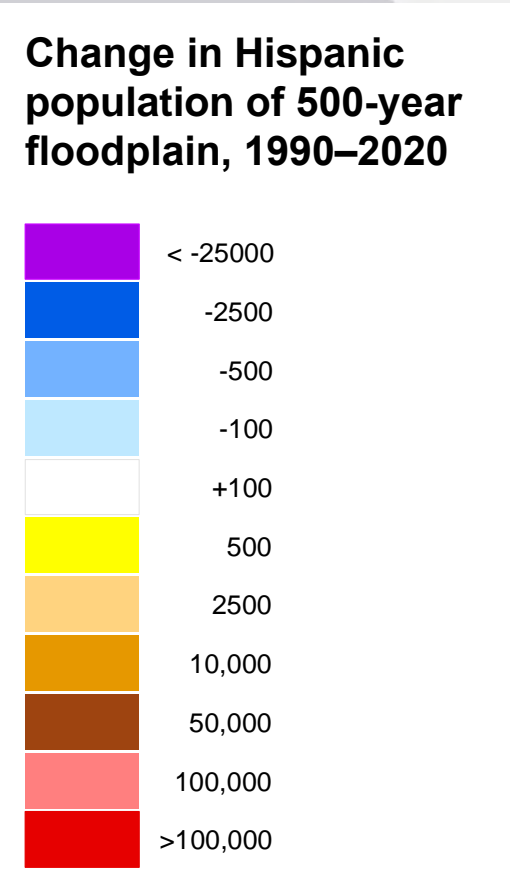


For details on method see <https://doi.org/10.1088/1748-9326/acadf5>
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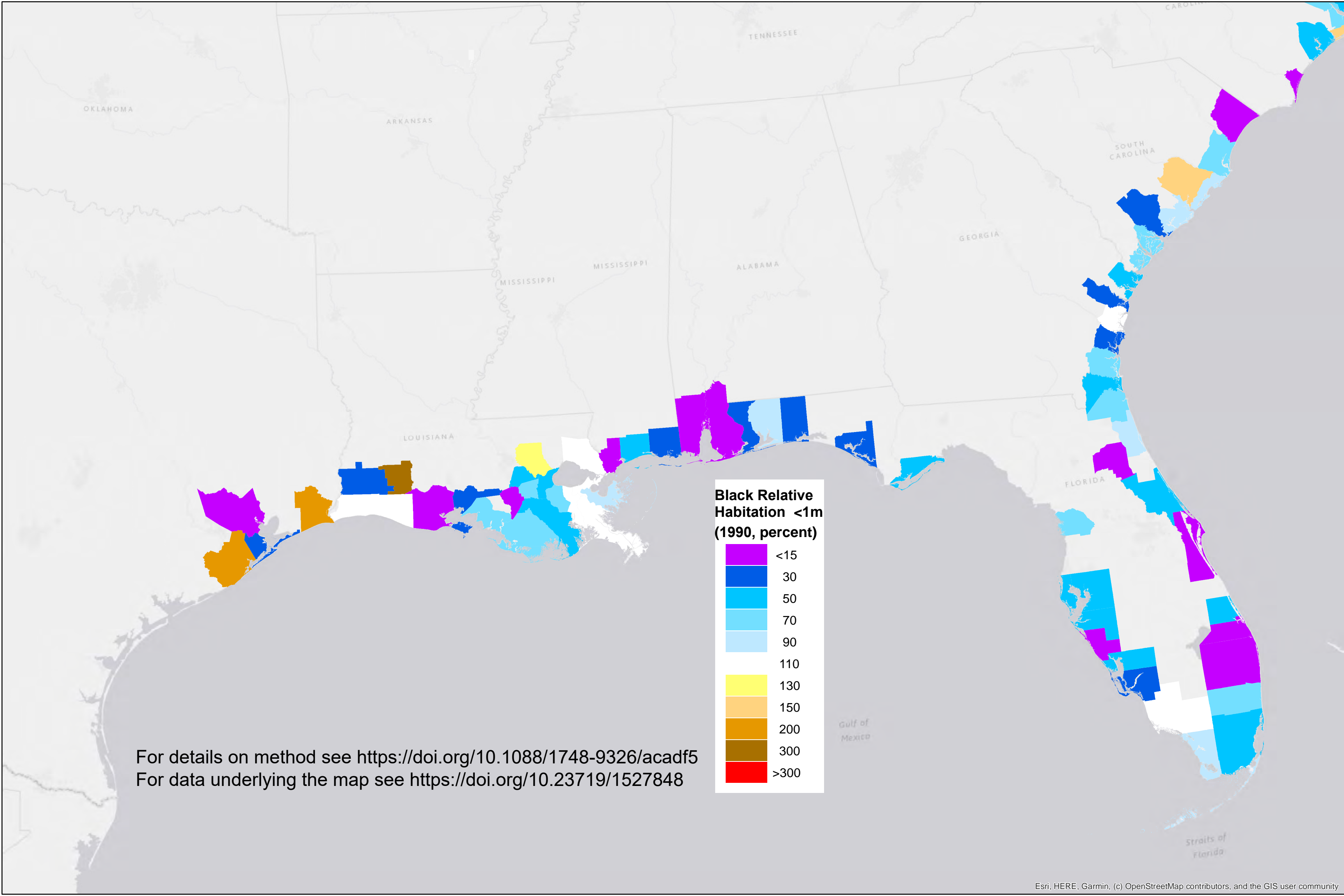




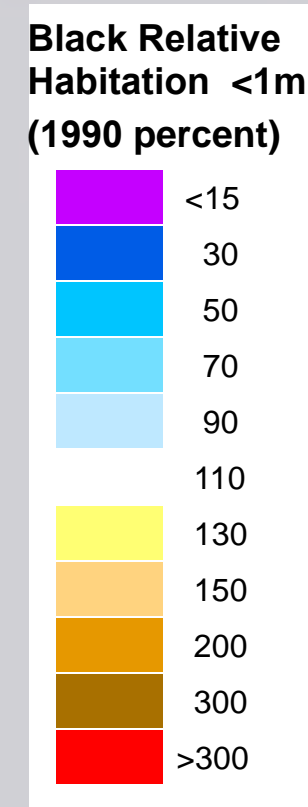
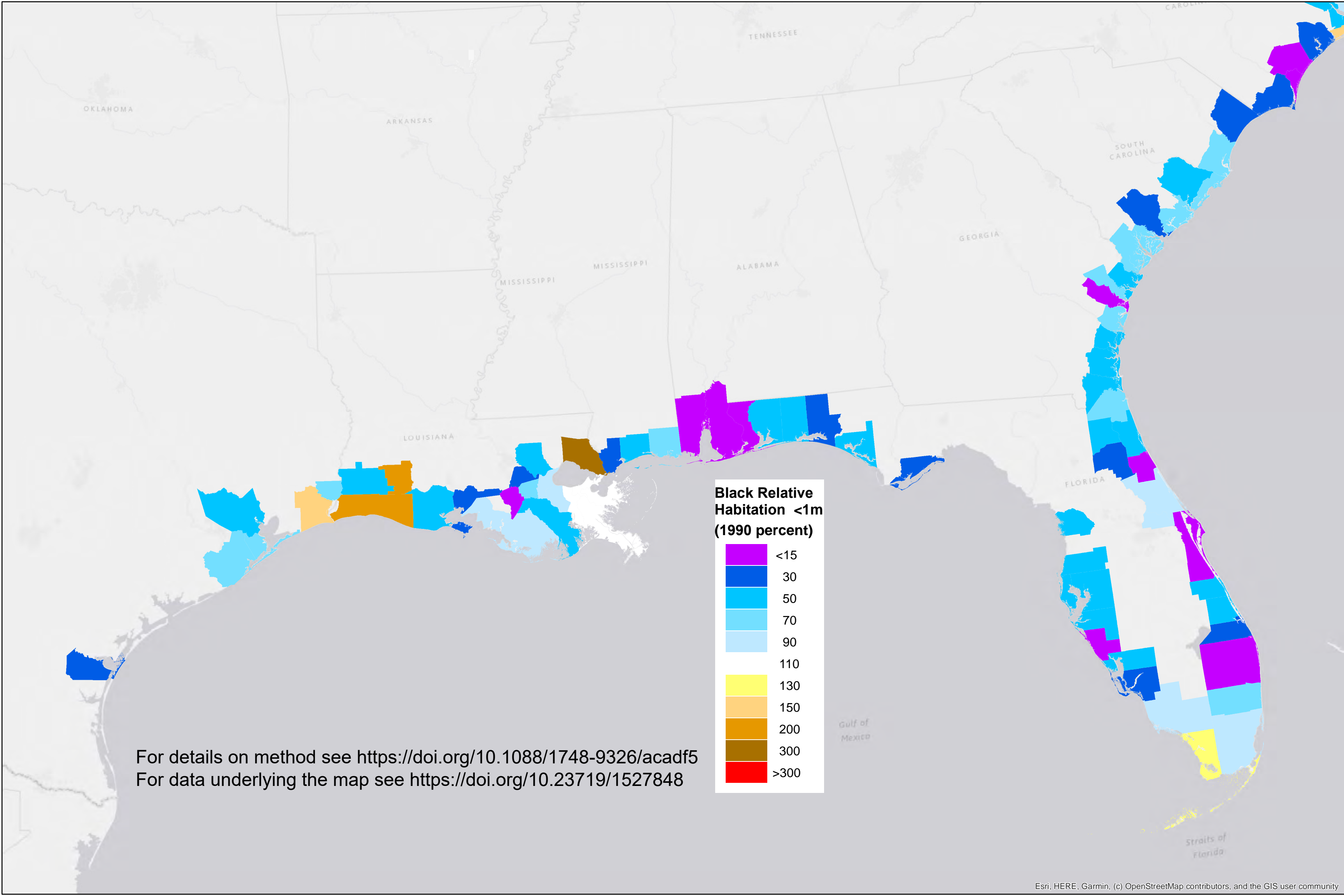
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For data underlying the map see <https://doi.org/10.23719/1527848>

Ratios of Disproportionality by County

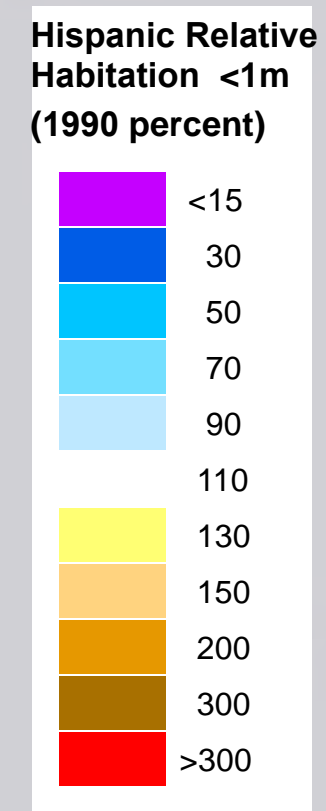
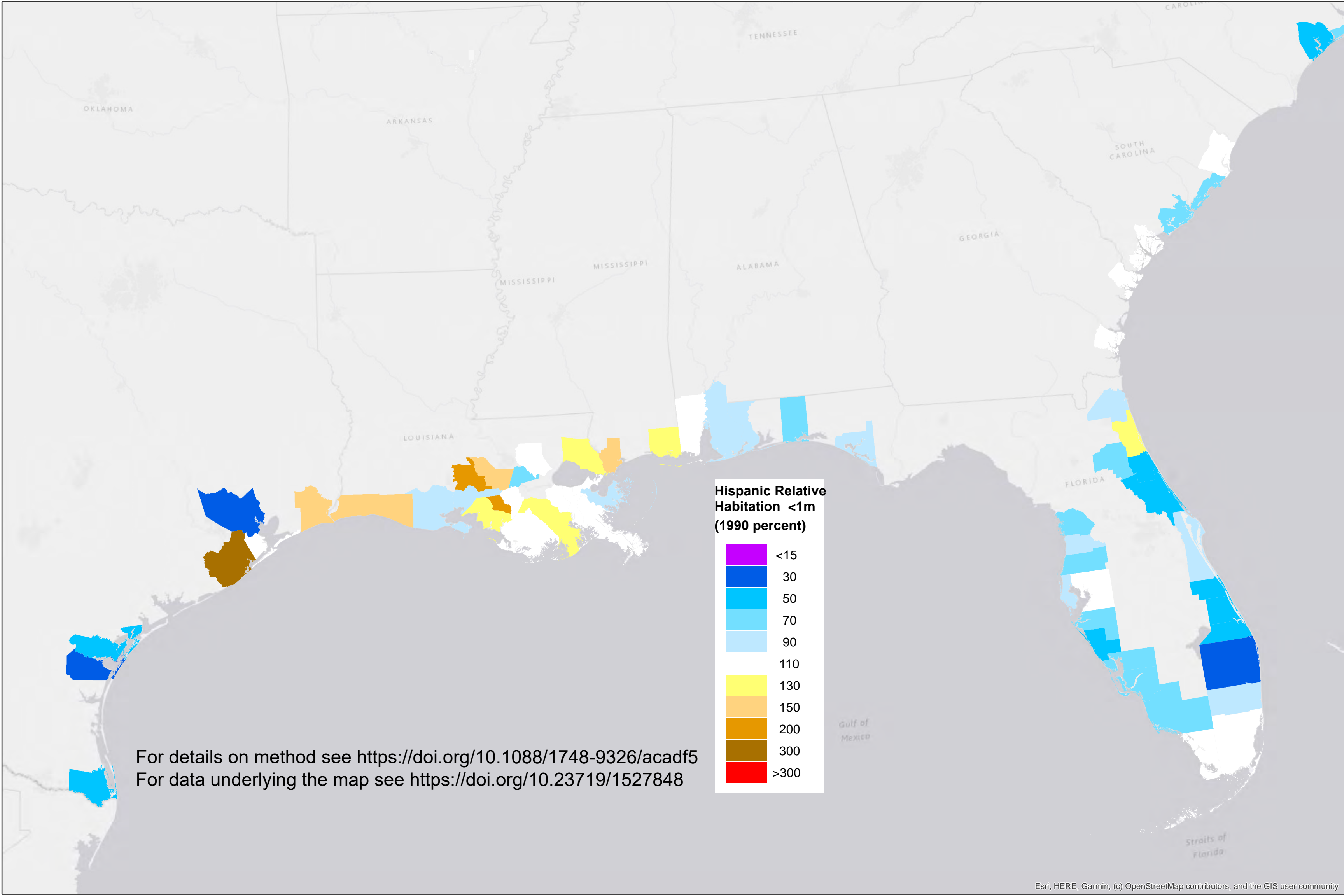
These maps show county-specific “ratios of disproportionality” as defined in the paper for which this document provides supplemental maps, expressed as a percentage. For each county, this ratio is calculated as the percentage of Black (or Hispanic) residents of a county who live below one meter, divided by the percentage of all residents in the county who live below one meter (times 100). The legend uses the term “Relative Habitation” to conserve space. When the ratio is 100, there is no disproportionality. If the ratio is greater (or less) than 100, then the Black (or Hispanic) population is more (or less) exposed to sea level rise than the general population of the county (ignoring different likelihoods of shore protection). For further details see the Supplemental Methods.



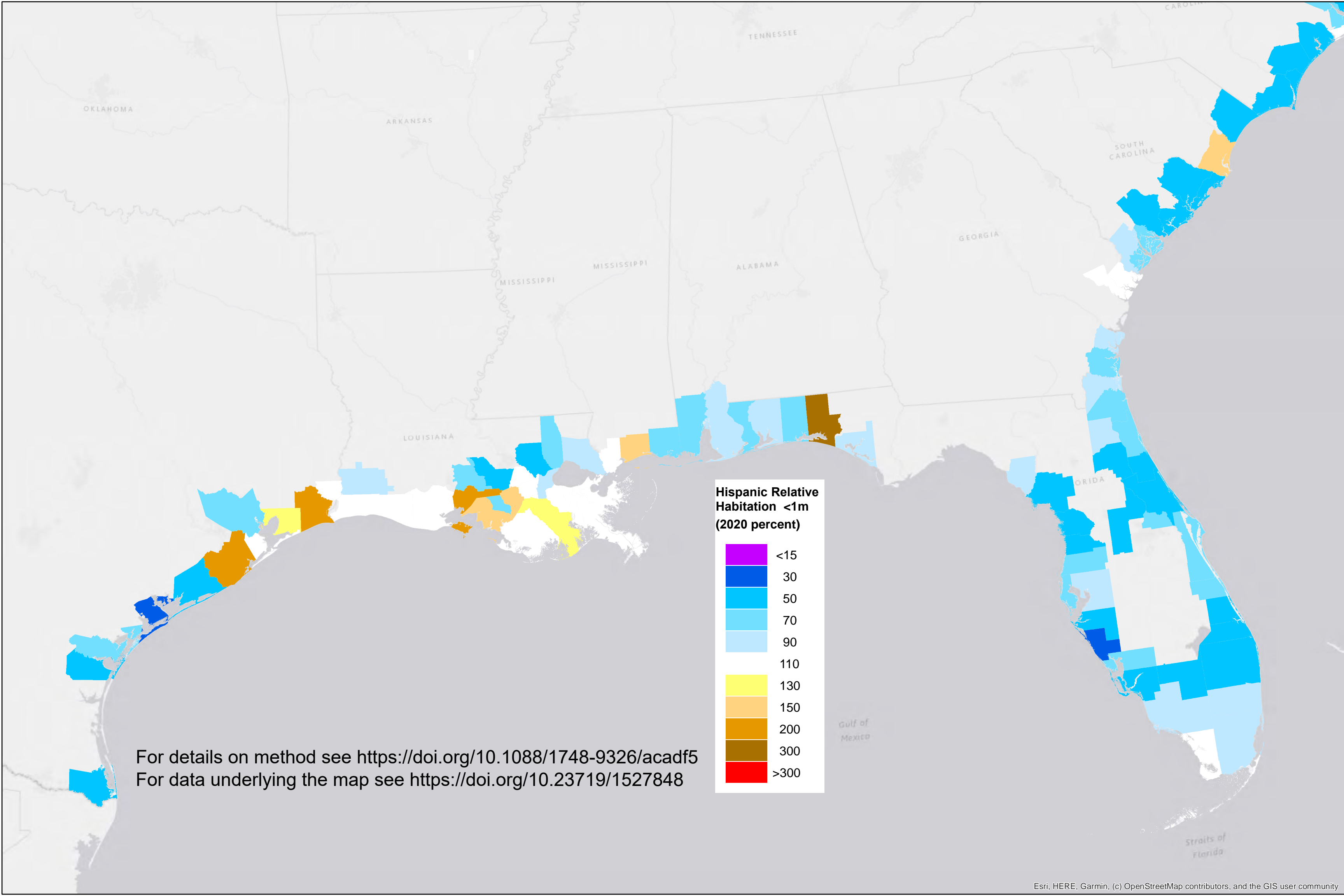
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For data underlying the map see <https://doi.org/10.23719/1527848>



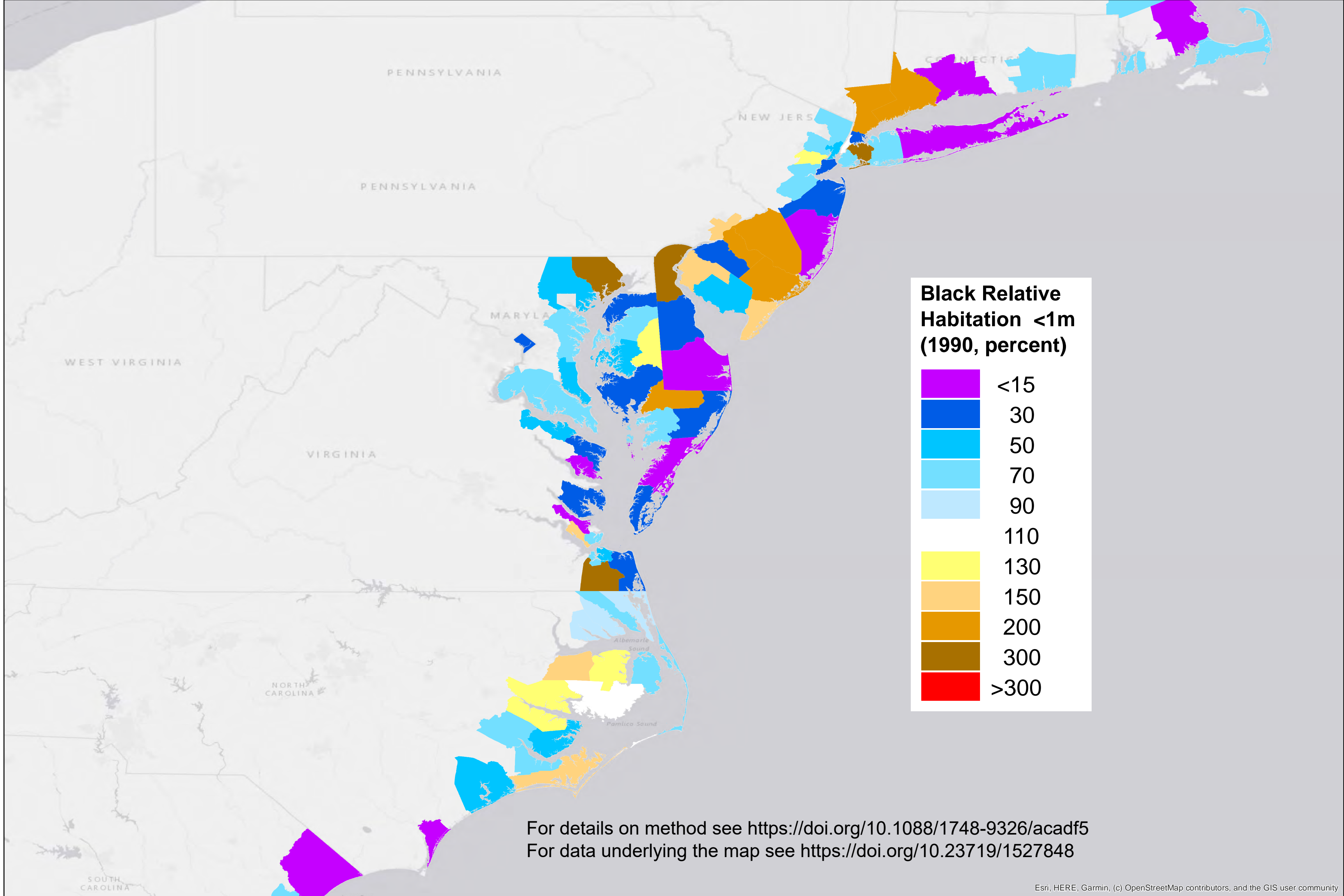
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For data underlying the map see <https://doi.org/10.23719/1527848>



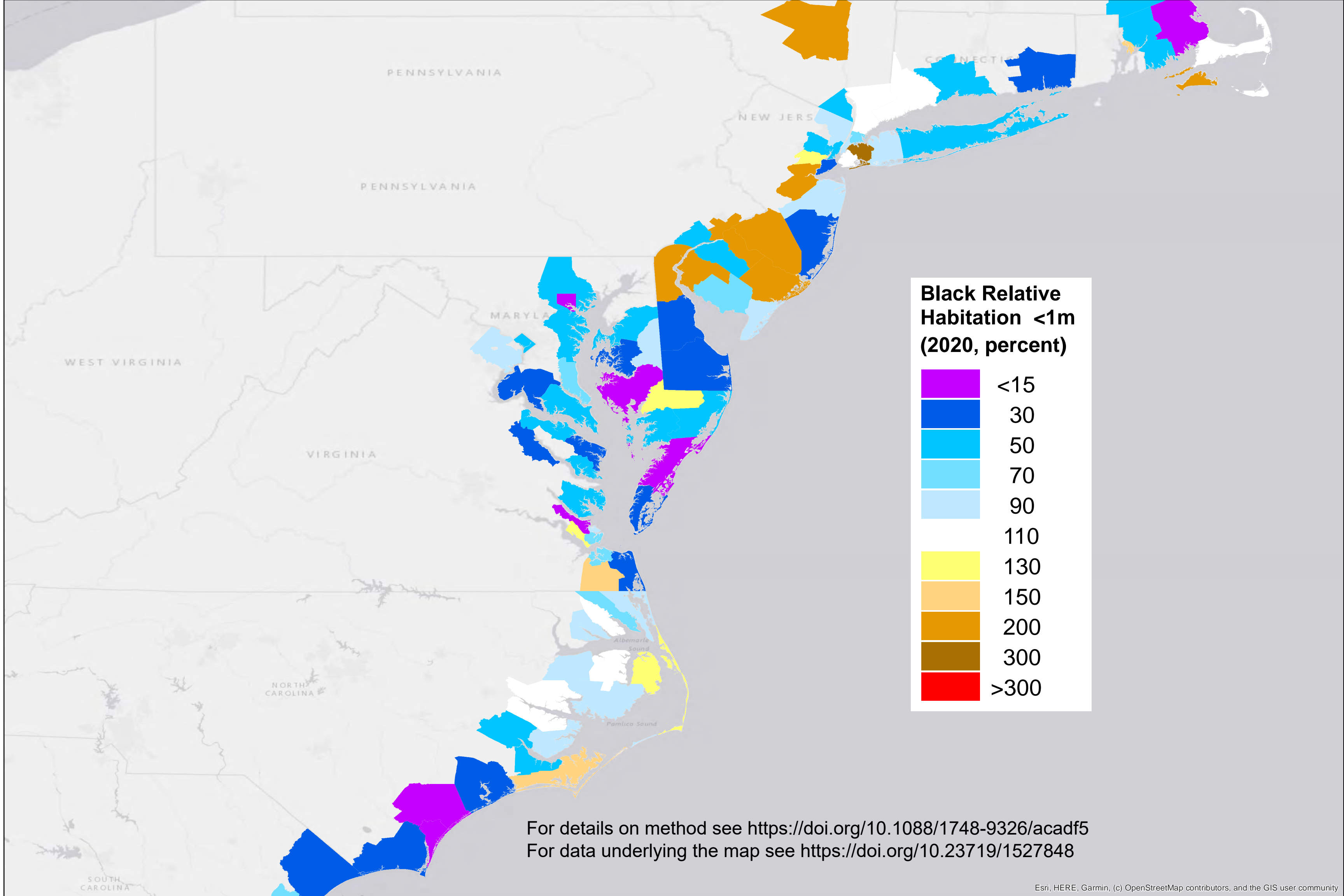
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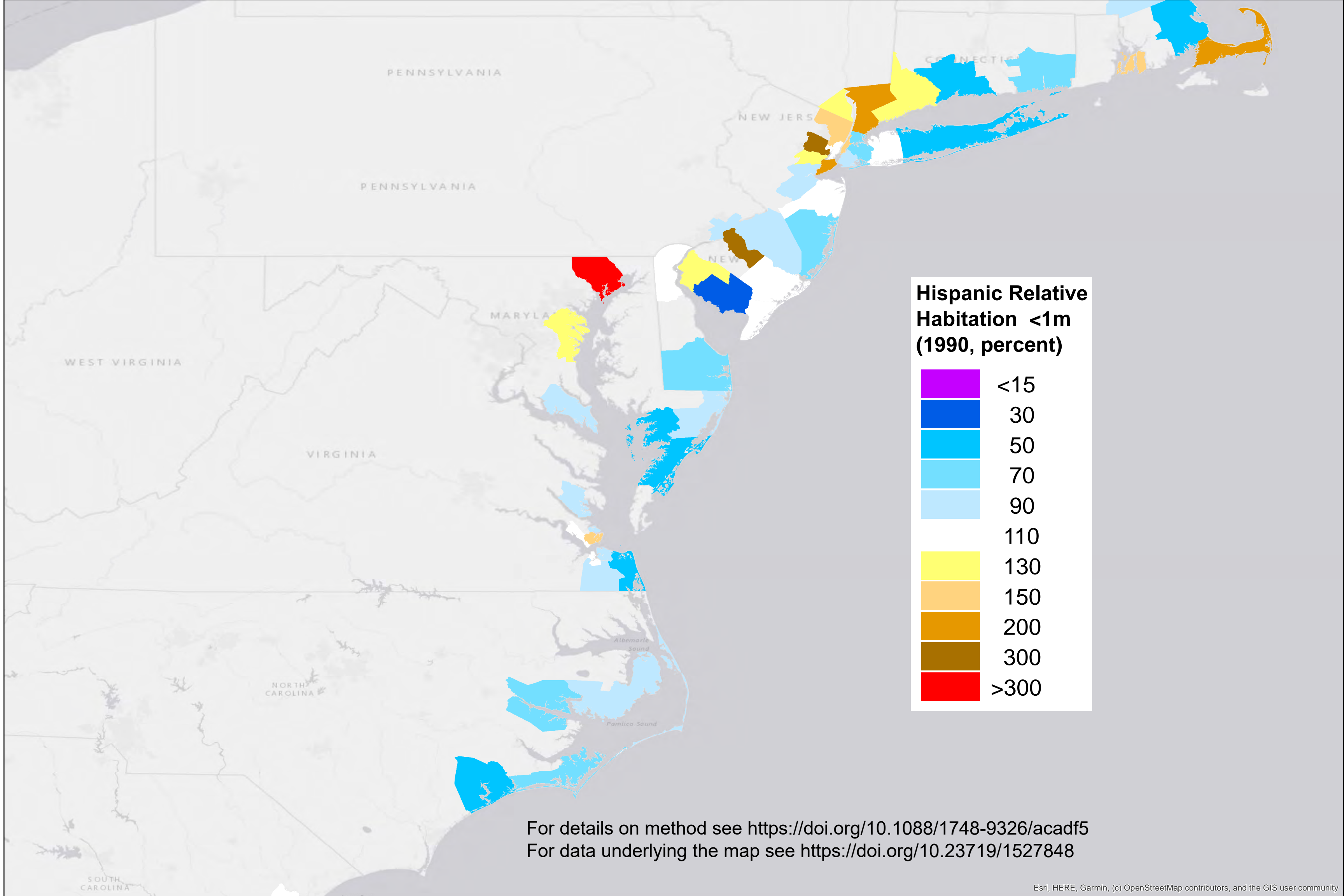


For details on method see <https://doi.org/10.1088/1748-9326/acadf5>
For data underlying the map see <https://doi.org/10.23719/1527848>

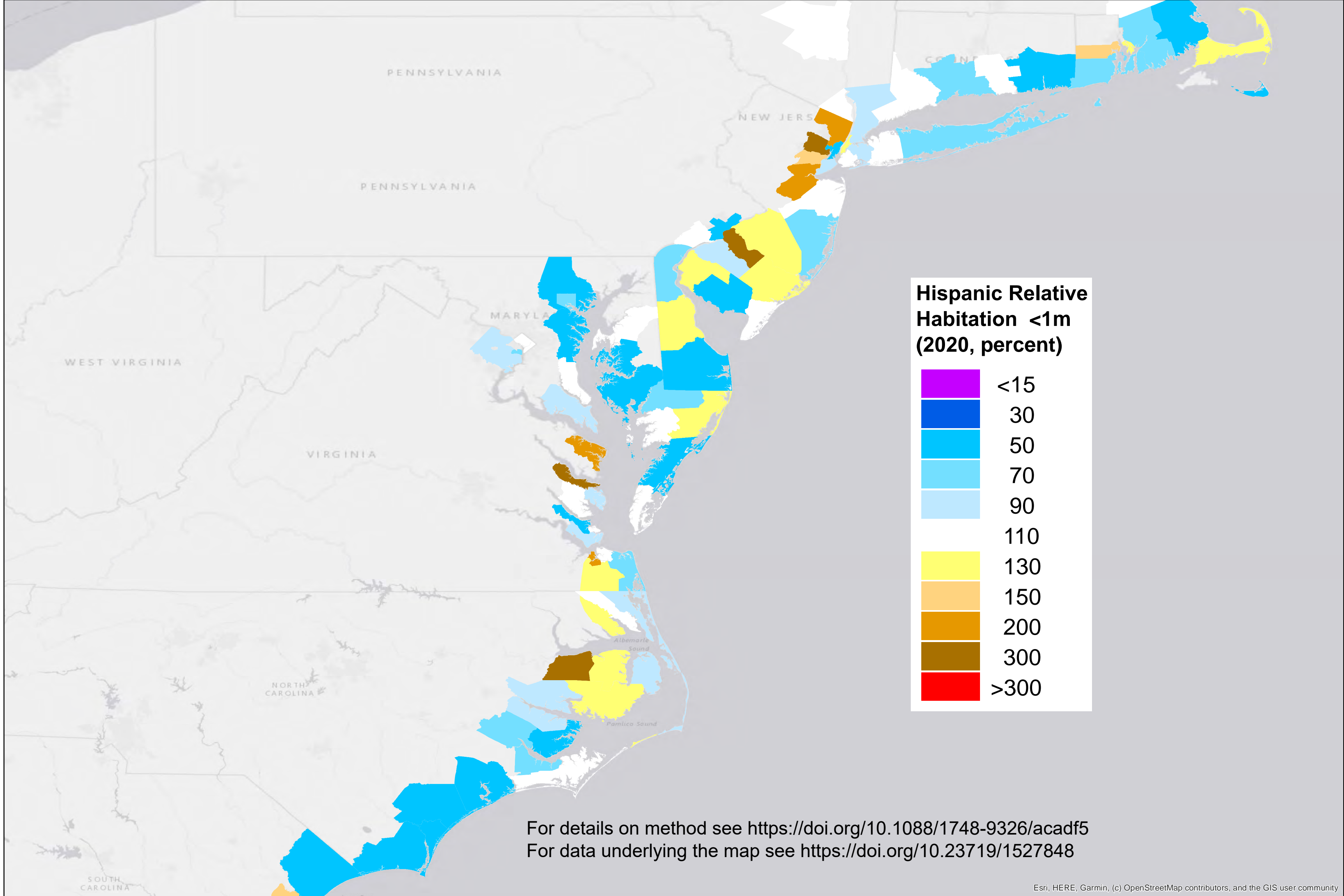


For details on method see <https://doi.org/10.1088/1748-9326/acadf5>
For data underlying the map see <https://doi.org/10.23719/1527848>

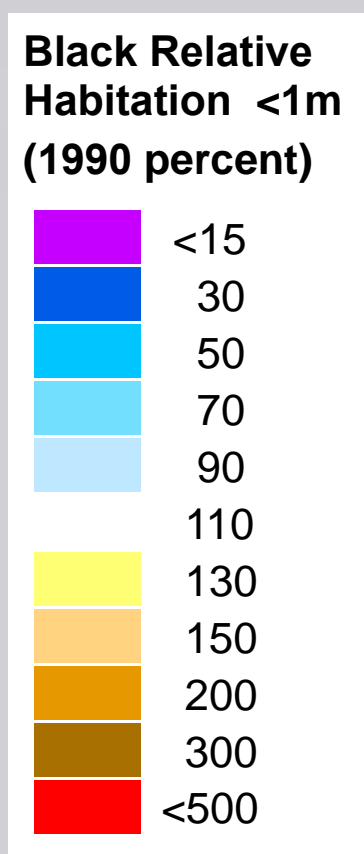




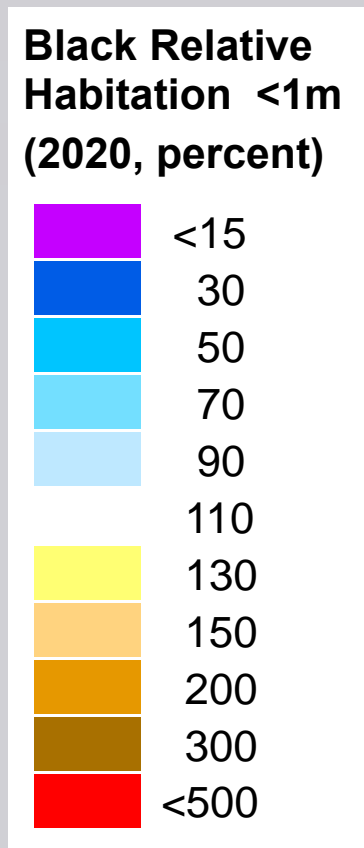
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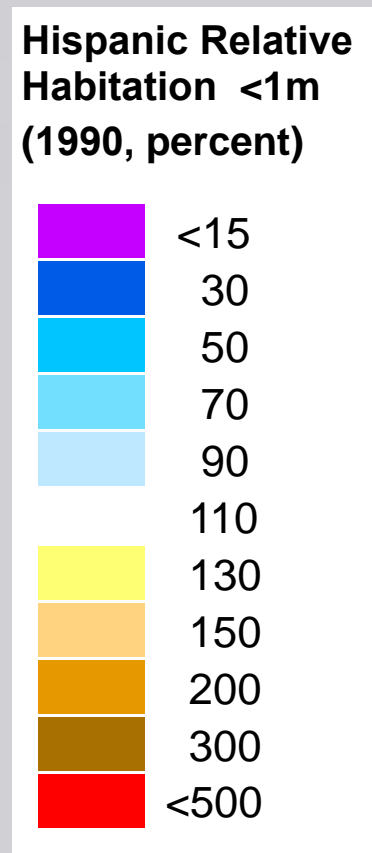
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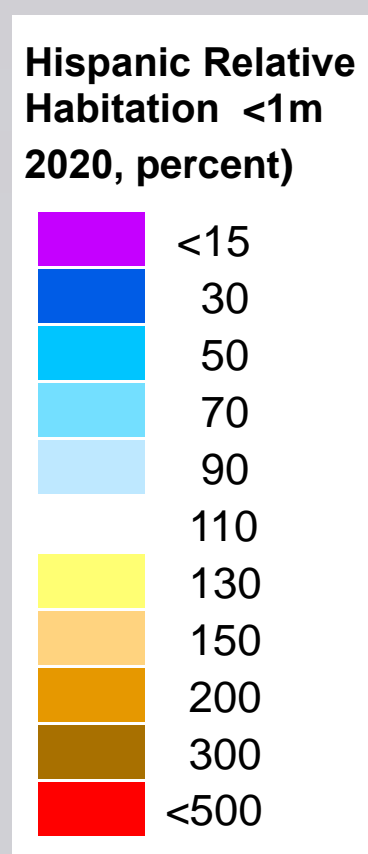
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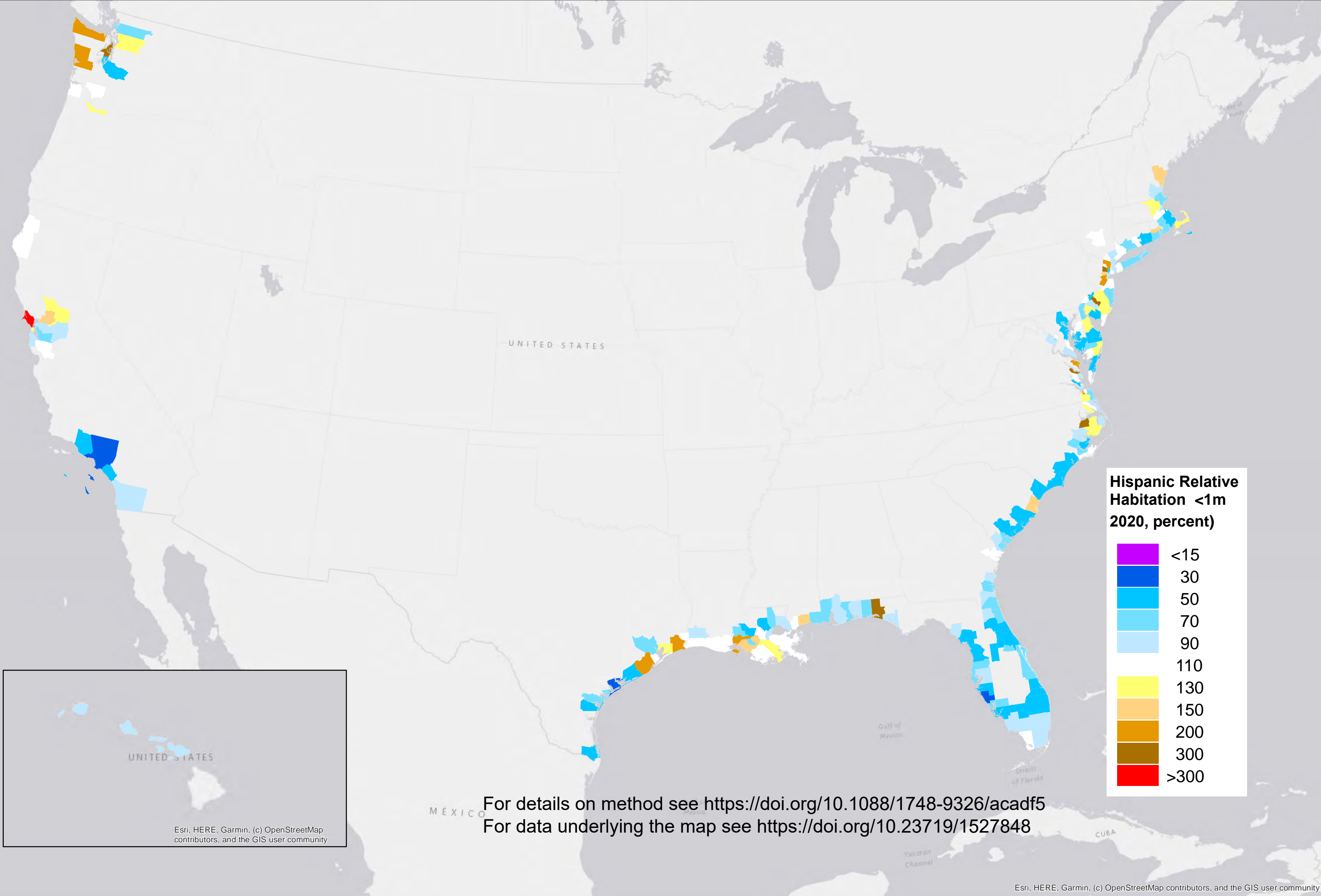
For details on method see <https://doi.org/10.1088/1748-9326/acadf5>
For data underlying the map see <https://doi.org/10.23719/1527848>



For details on method see <https://doi.org/10.1088/1748-9326/acadf5>
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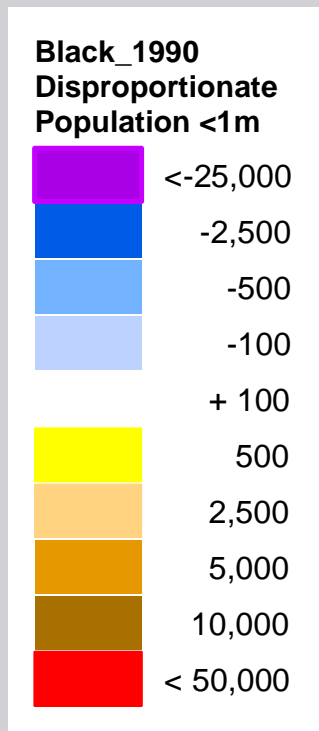
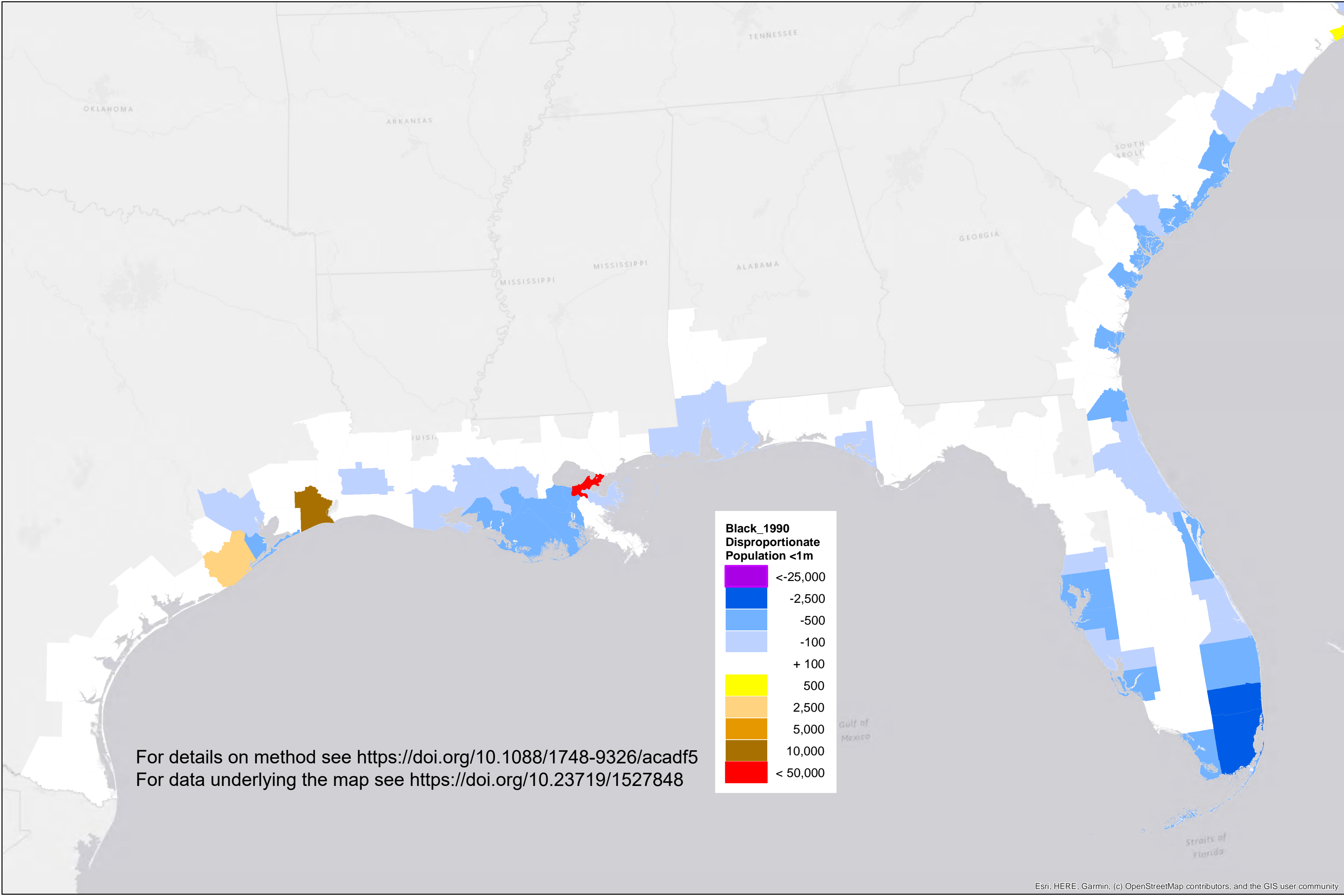


For details on method see <https://doi.org/10.1088/1748-9326/acadf5>
For data underlying the map see <https://doi.org/10.23719/1527848>

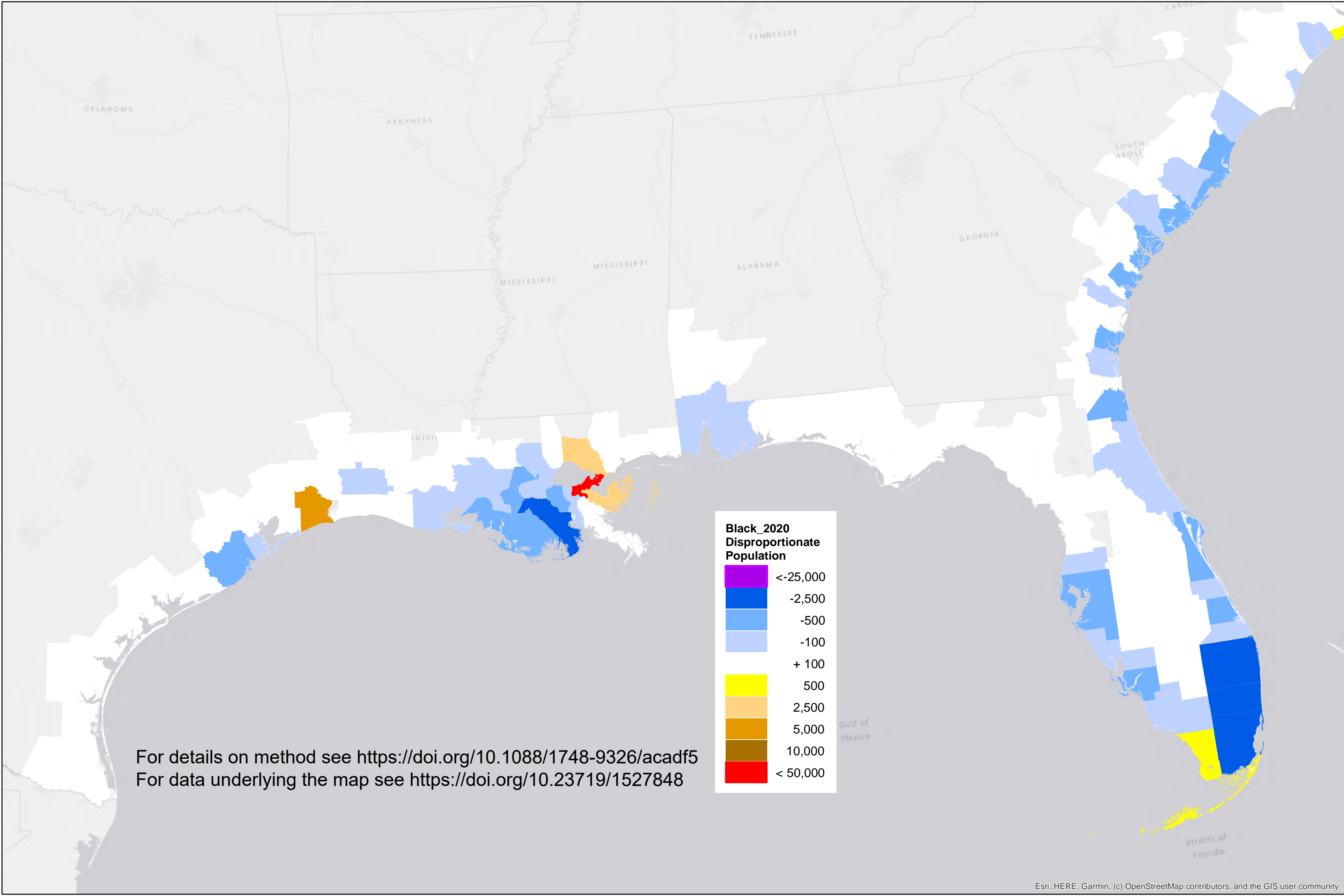


Magnitude of the Extent to Which Black Residents Inhabit Land Vulnerable to Sea Level Rise

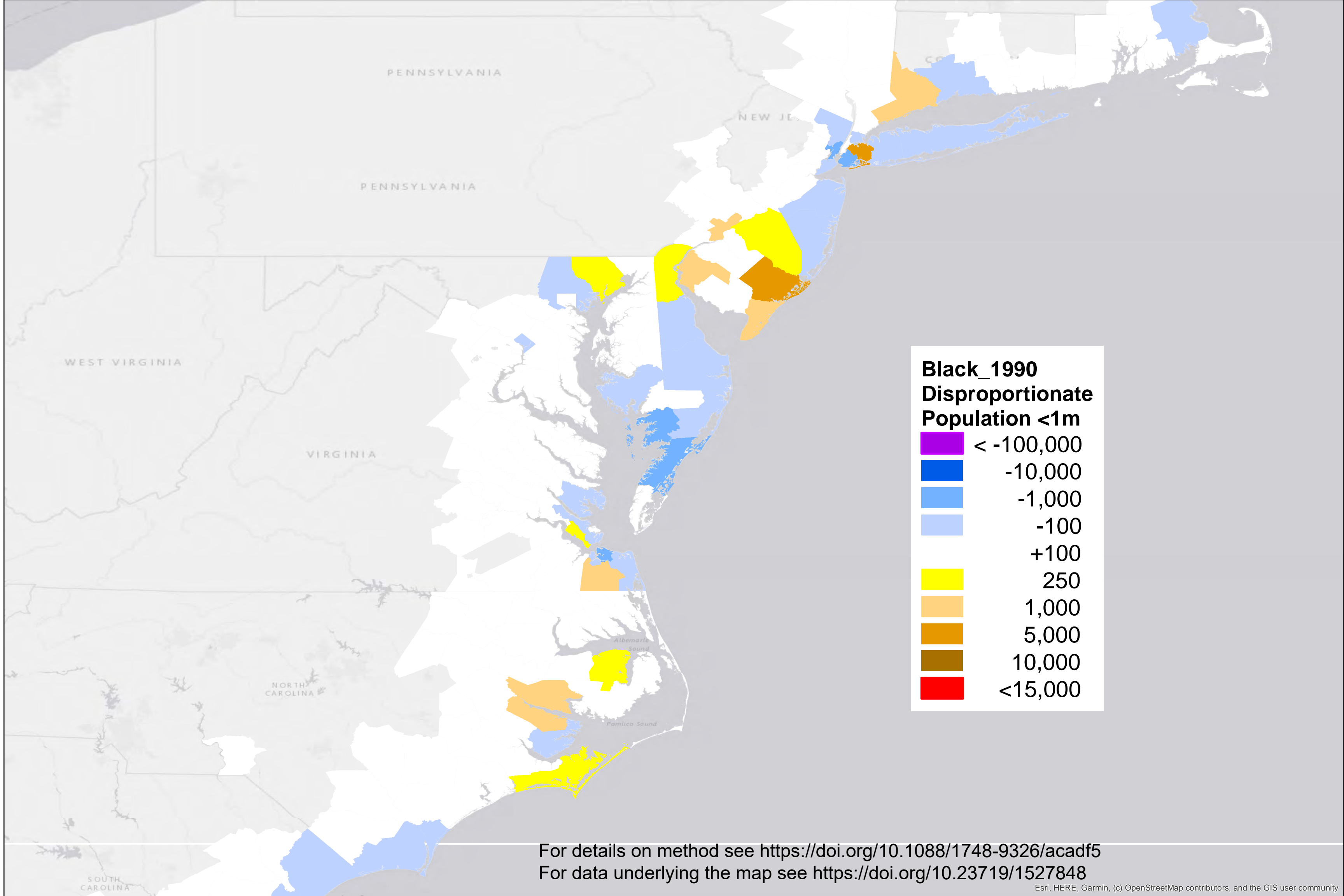
The maps of county-specific “ratios of disproportionality” presented elsewhere show the extent that Black or Hispanic people reside in lands vulnerable to sea level rise in particular counties, but the nationwide significance is hard to discern because counties have different populations. The maps here, in effect, weight those ratios by each county’s population below one meter. More precisely, these maps show the difference between the actual Black population below one meter, and a “counterfactual”, i.e., what the Black population below one meter would be if the percentage of Black county residents below one meter was equal to the percentage of all residents below one meter. The county-scale ratio of disproportionality (discussed in [the paper for which these maps are a supplement](#)) is calculated by adding those counterfactuals across all counties and comparing that sum to the total Black population in this hazard zone. For further details see the Supplemental Methods section.

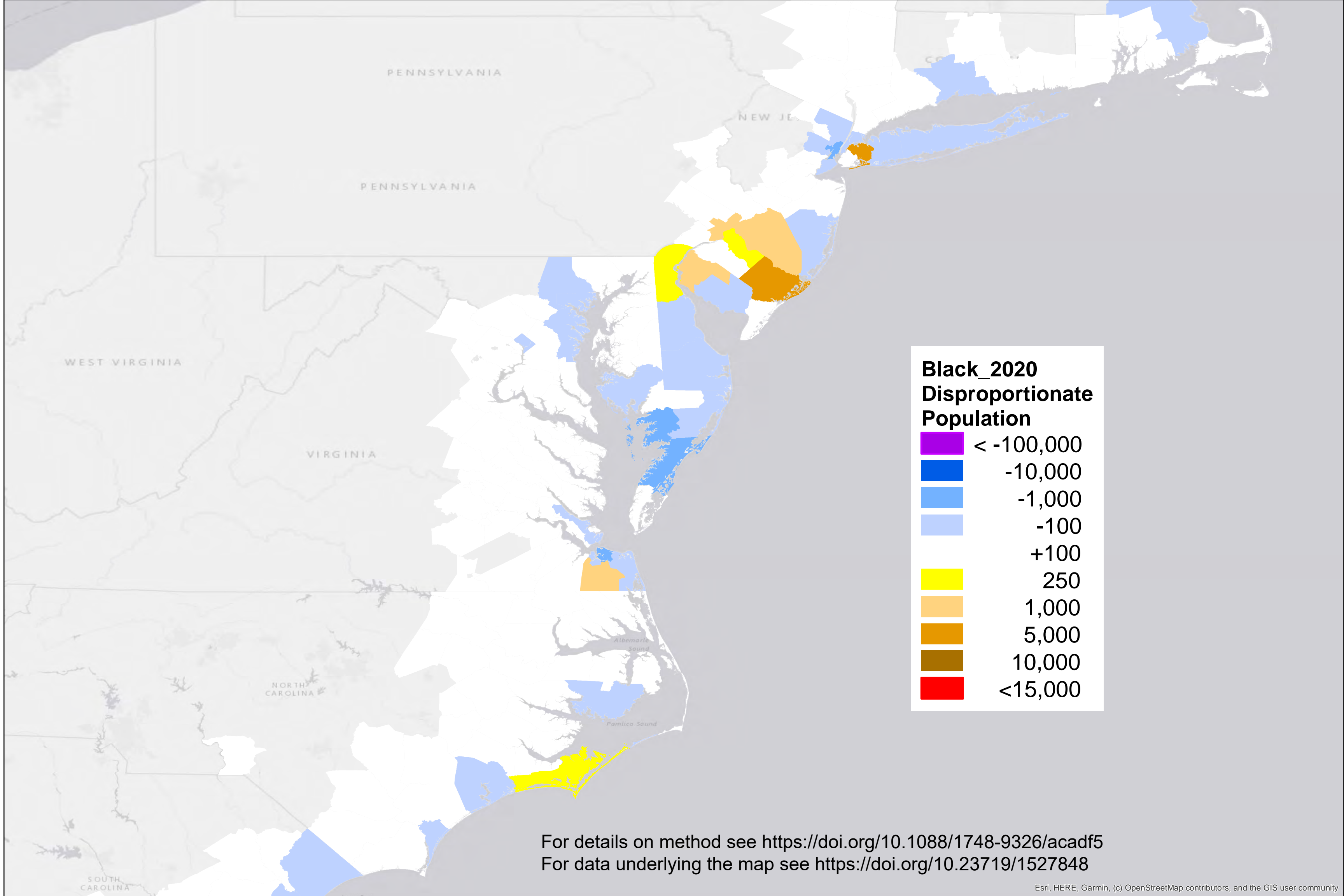


For details on method see <https://doi.org/10.1088/1748-9326/acadf5>
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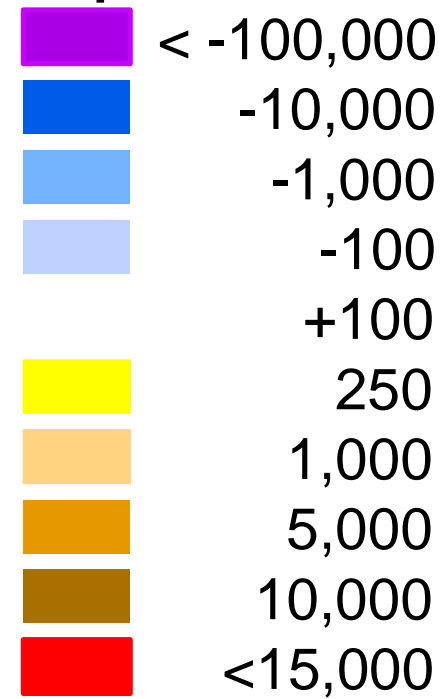


For details on method see <https://doi.org/10.1088/1748-9326/acadf5>
For data underlying the map see <https://doi.org/10.23719/1527848>

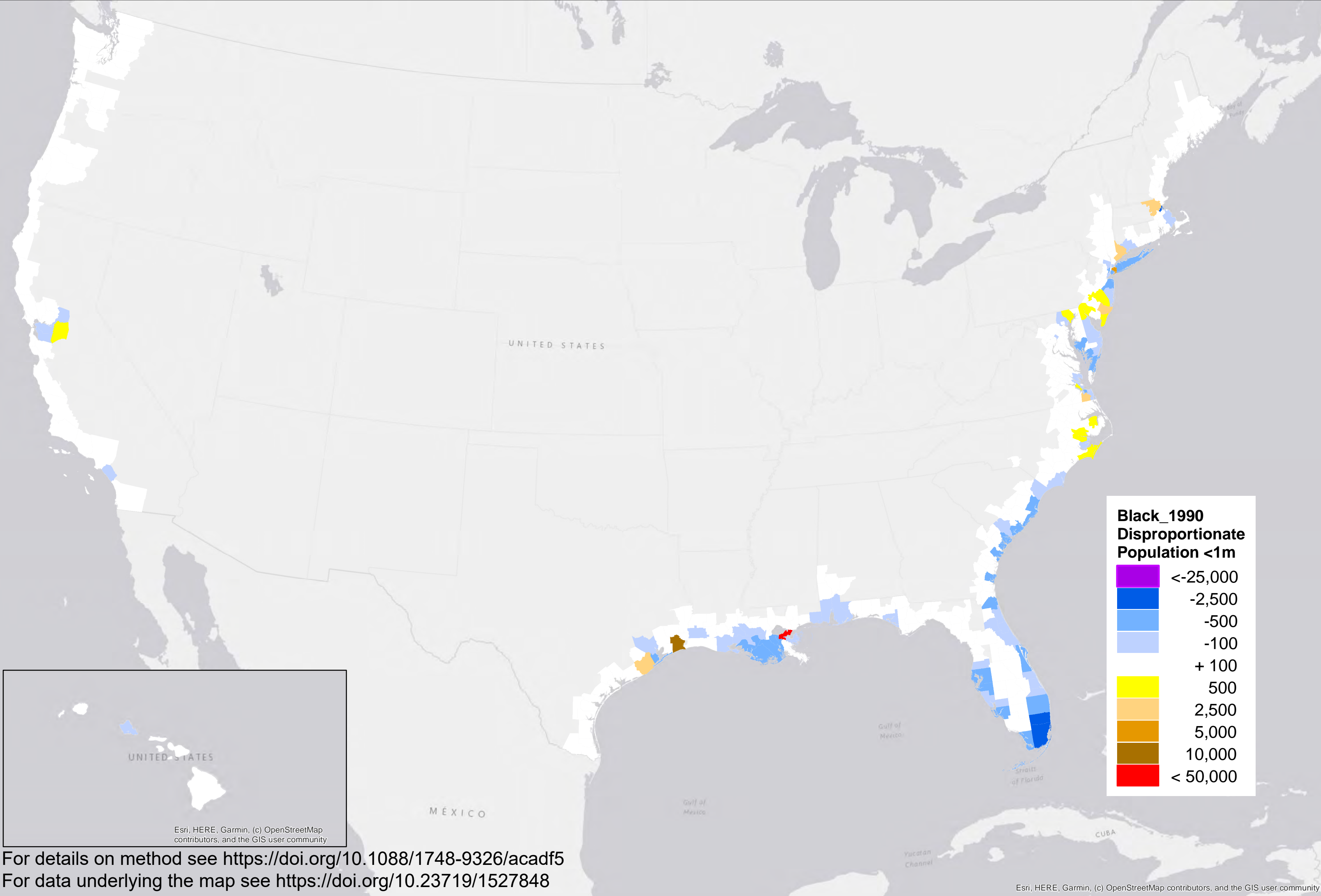




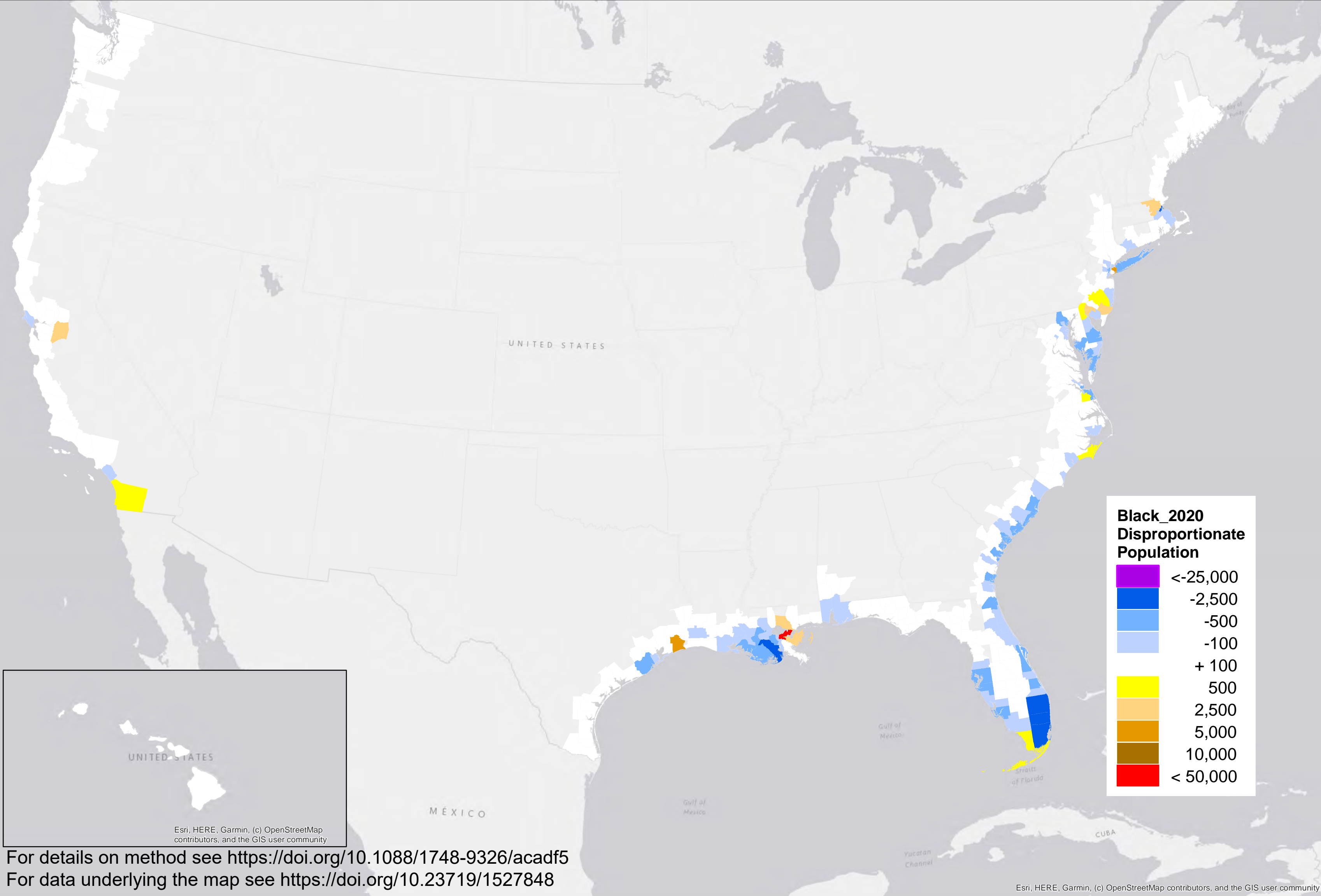
**Black_2020
Disproportionate
Population**



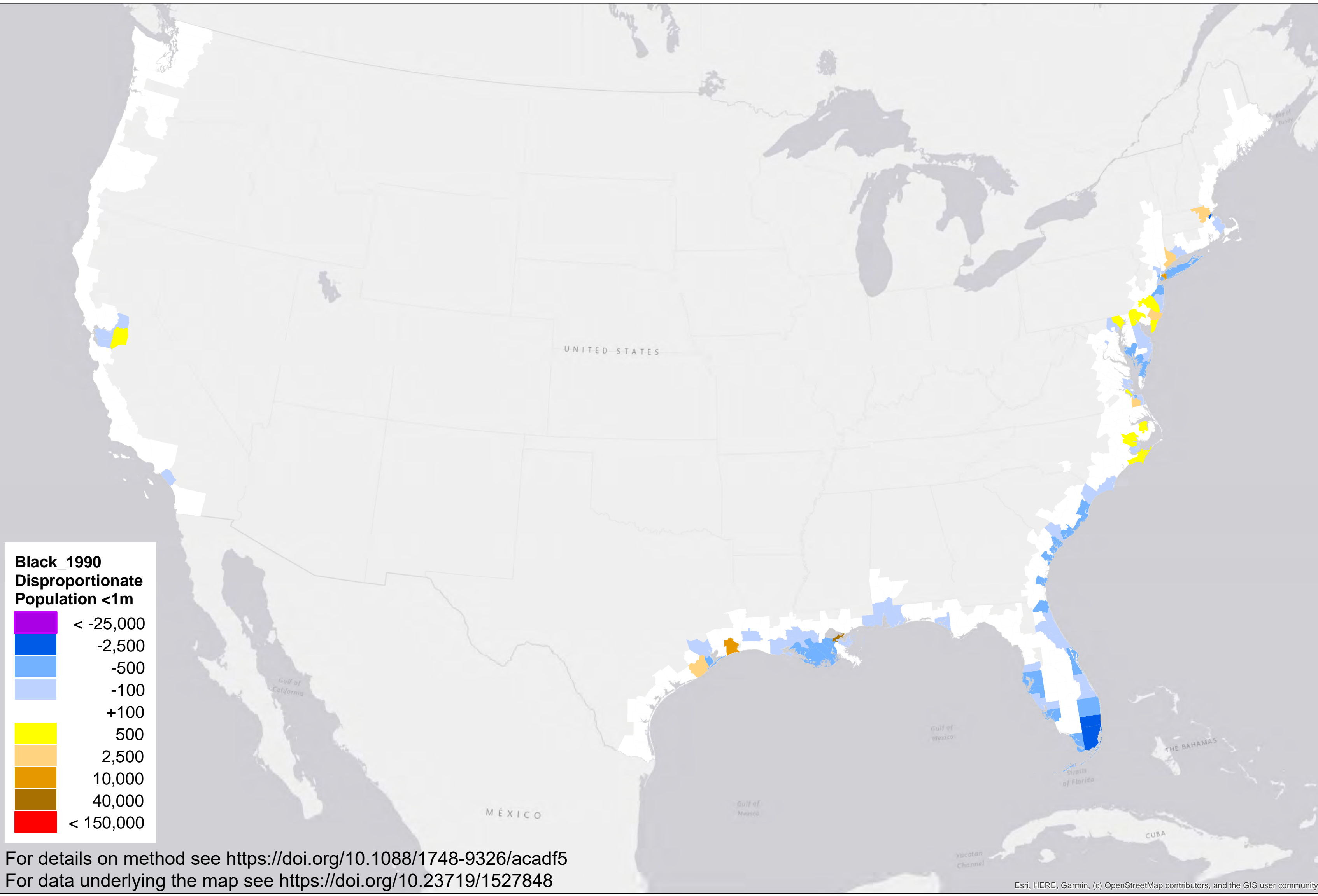
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For data underlying the map see <https://doi.org/10.23719/1527848>



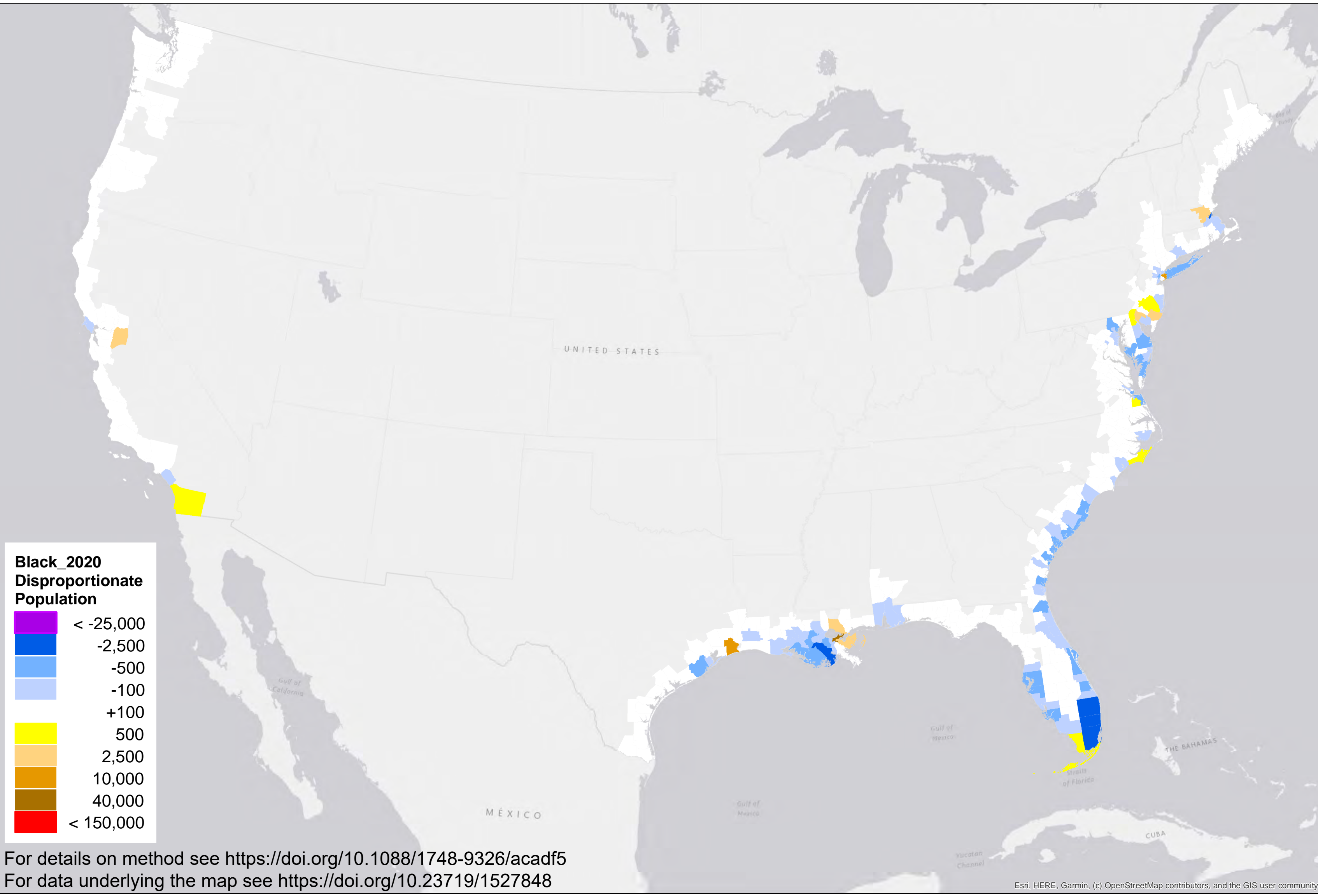
For details on method see <https://doi.org/10.1088/1748-9326/acadf5>
For data underlying the map see <https://doi.org/10.23719/1527848>



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