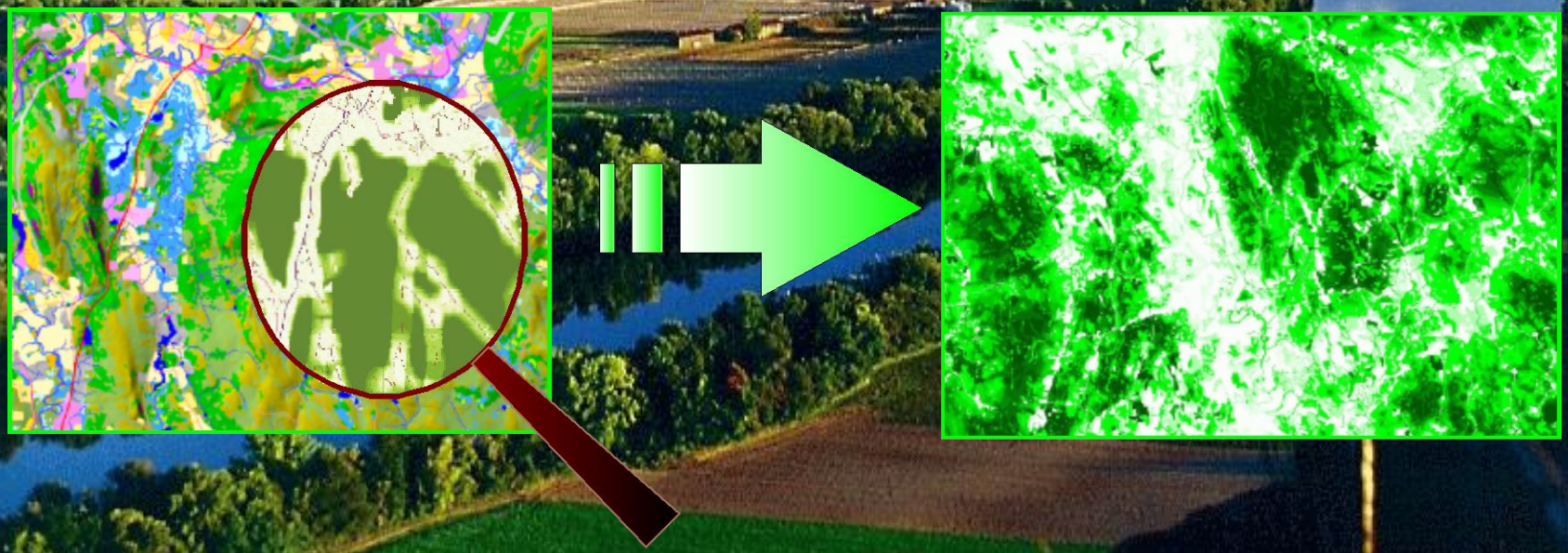
Designing Sustainable Landscapes in the Northeast

A project of the North Atlantic Landscape Conservation Cooperative & Northeast Climate Science Center

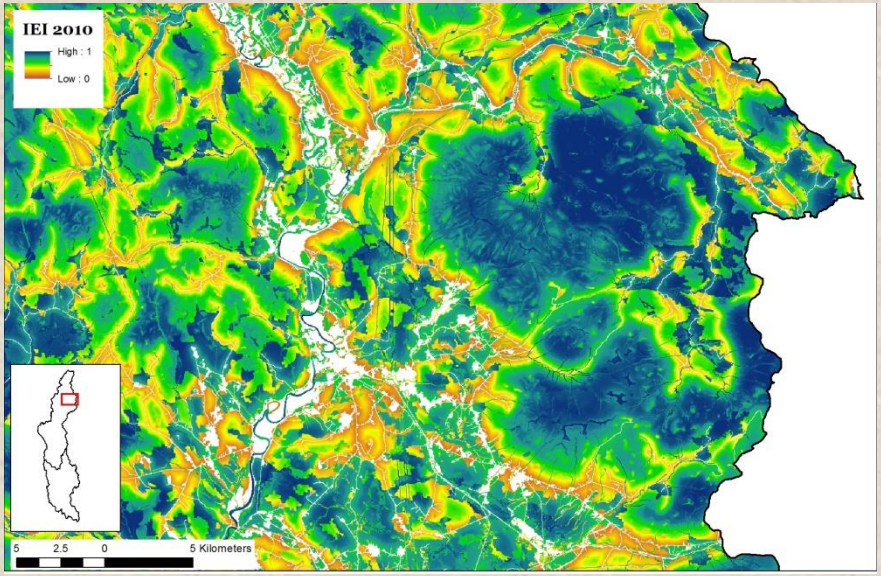
Landscape Conservation Design
March 27, 2015

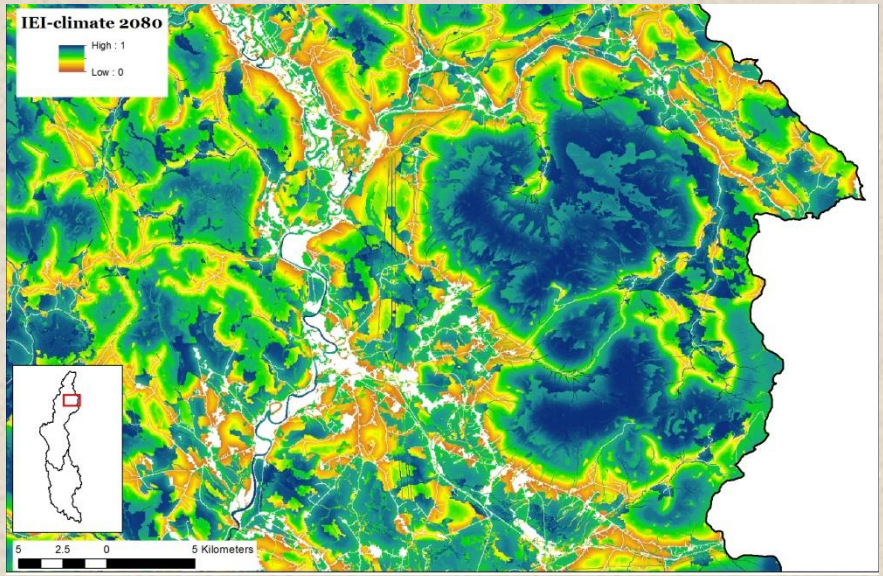


Incorporating Future Conditions

Ecosystem: IEI-climate

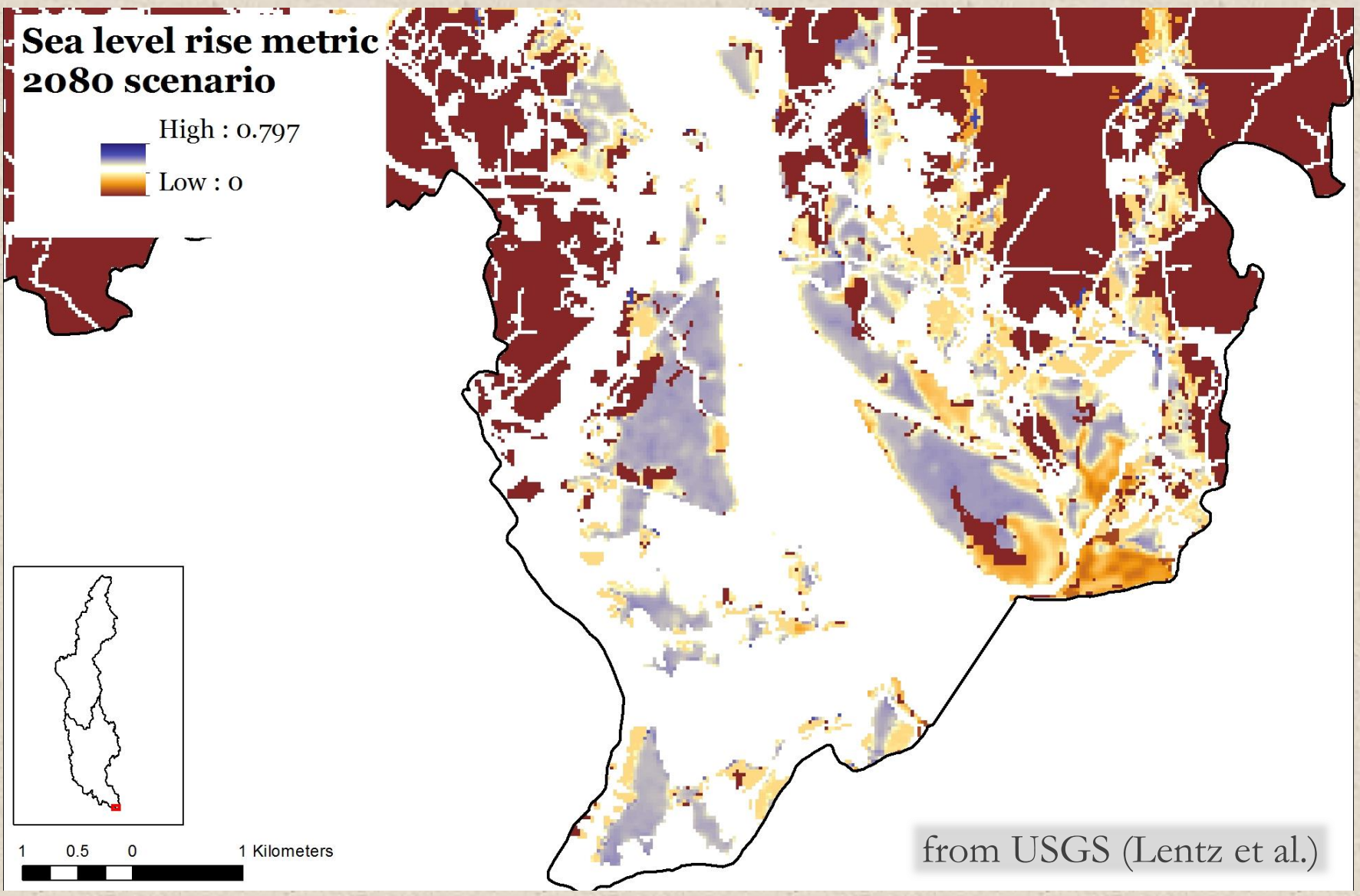
- Add *sea level rise* metric
- Add *climate stressor* metric
- Compute resiliency metrics (*similarity, connectedness, aquatic connectedness*) with future climate settings (*gdd, tmin, heat35, wet, volume*)
- Compute *IEI-climate*





Ecosystem: IEI-climate

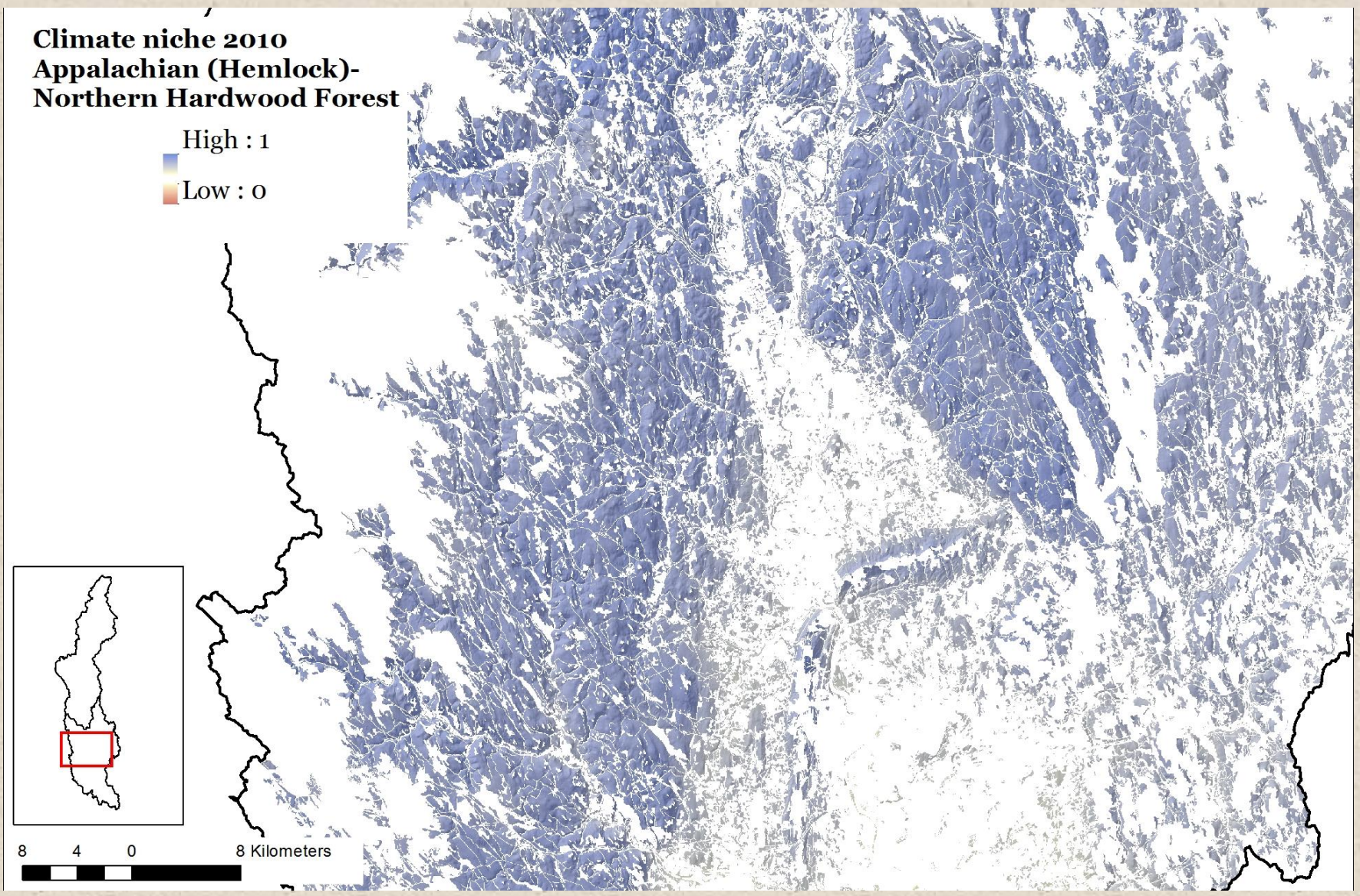
Sea level rise metric



from USGS (Lentz et al.)

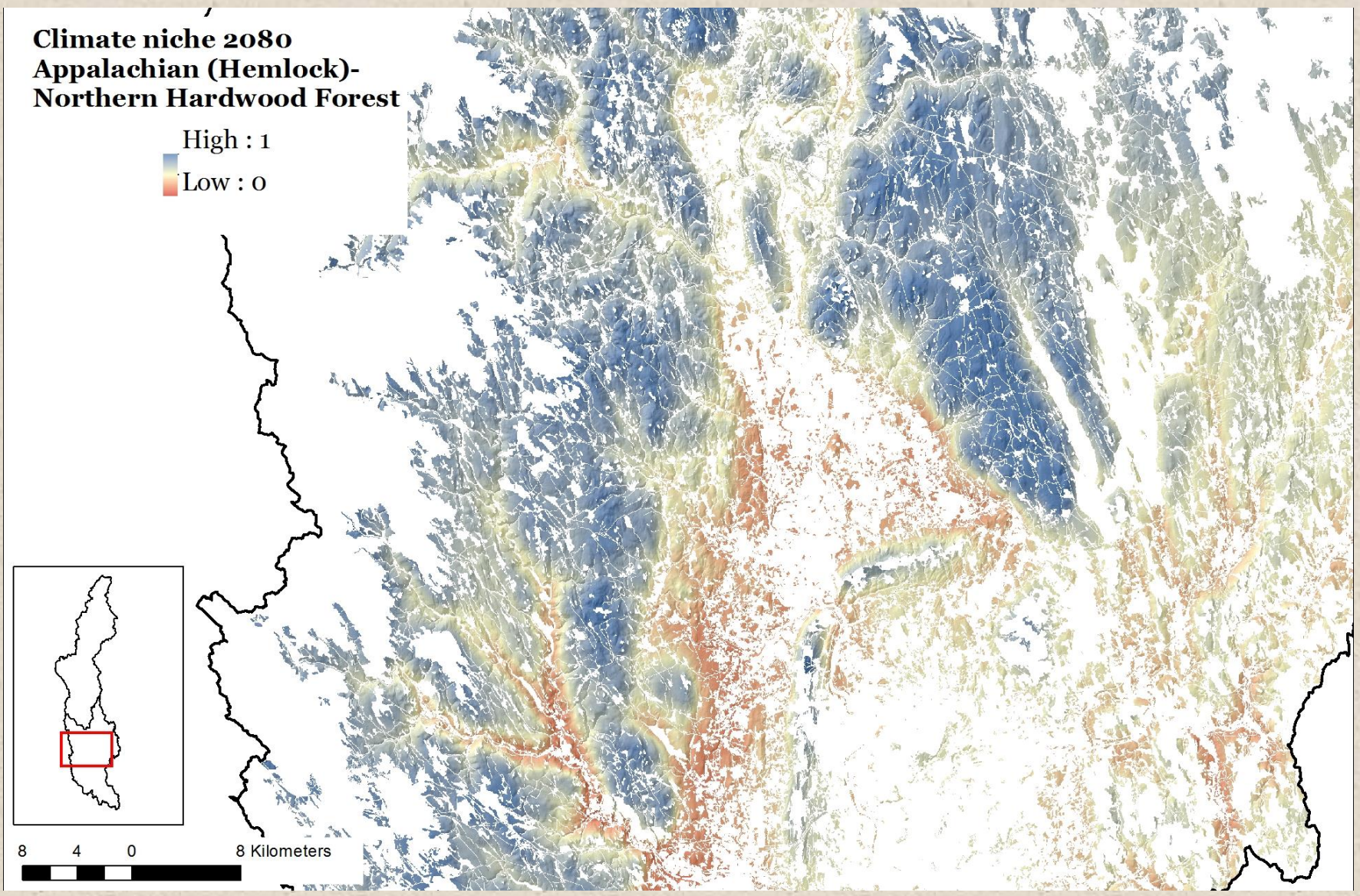
Ecosystem: IEI-climate

Climate stressor metric



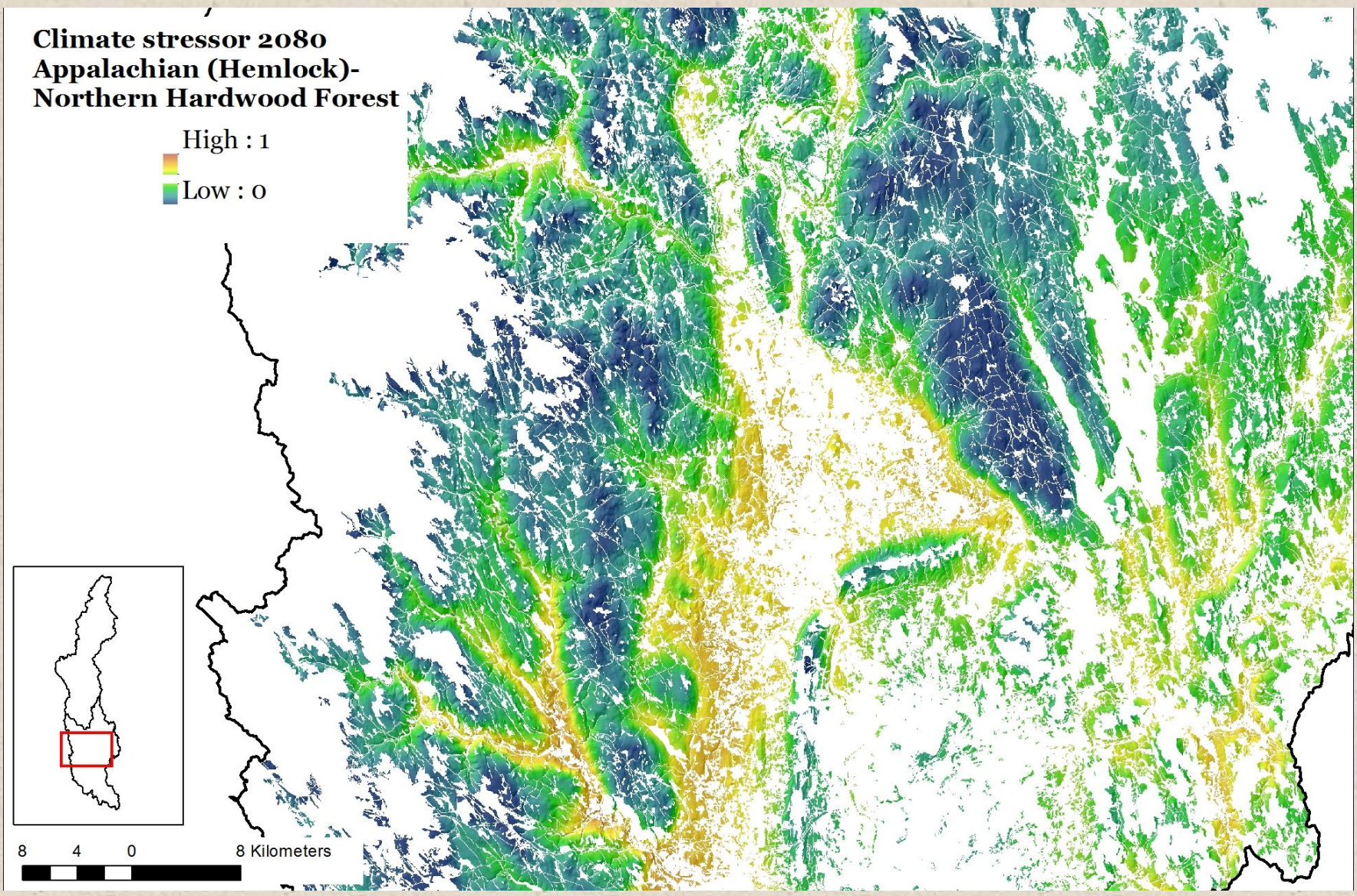
Ecosystem: IEI-climate

Climate stressor metric



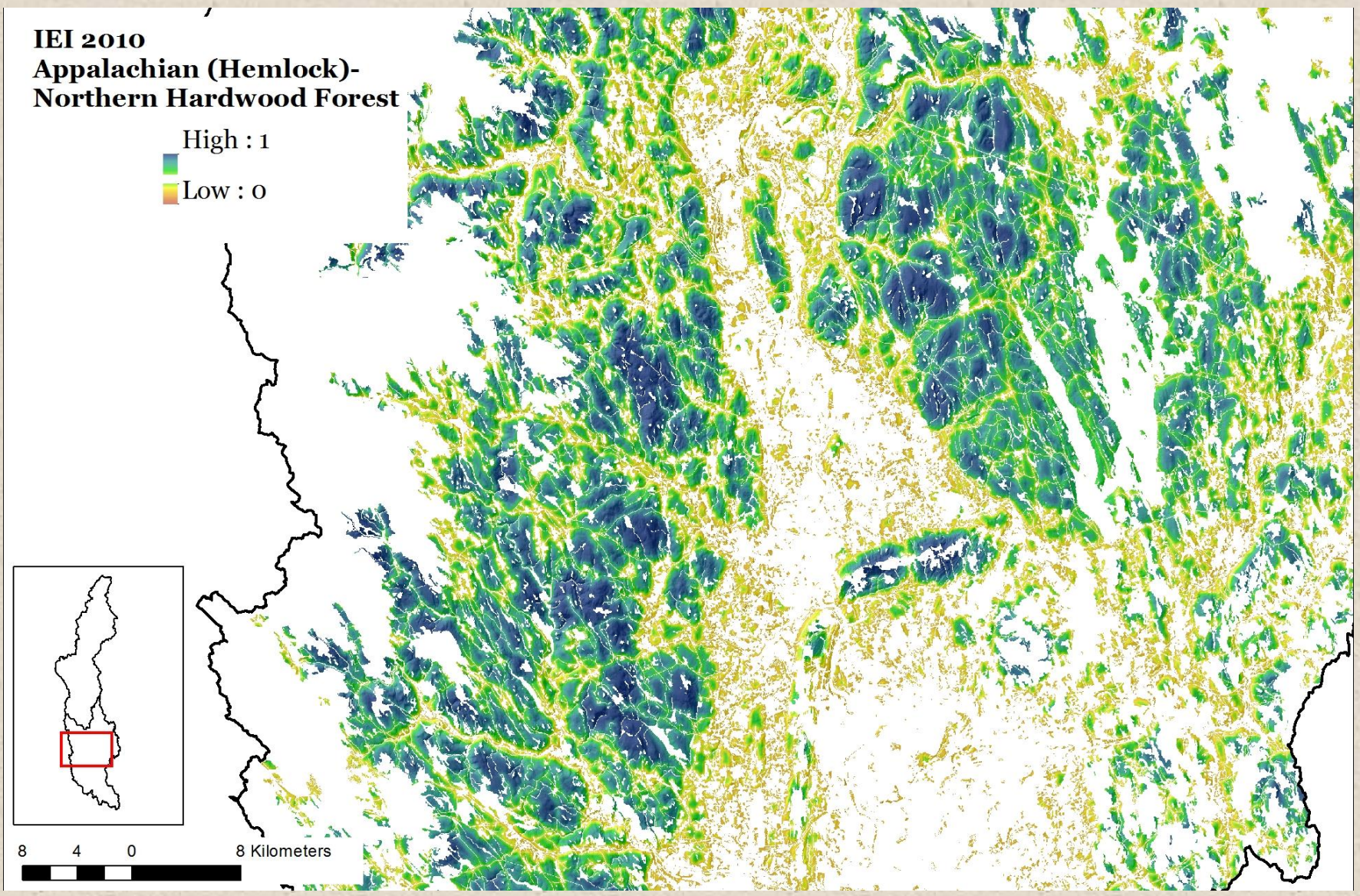
Ecosystem: IEI-climate

Climate stressor metric



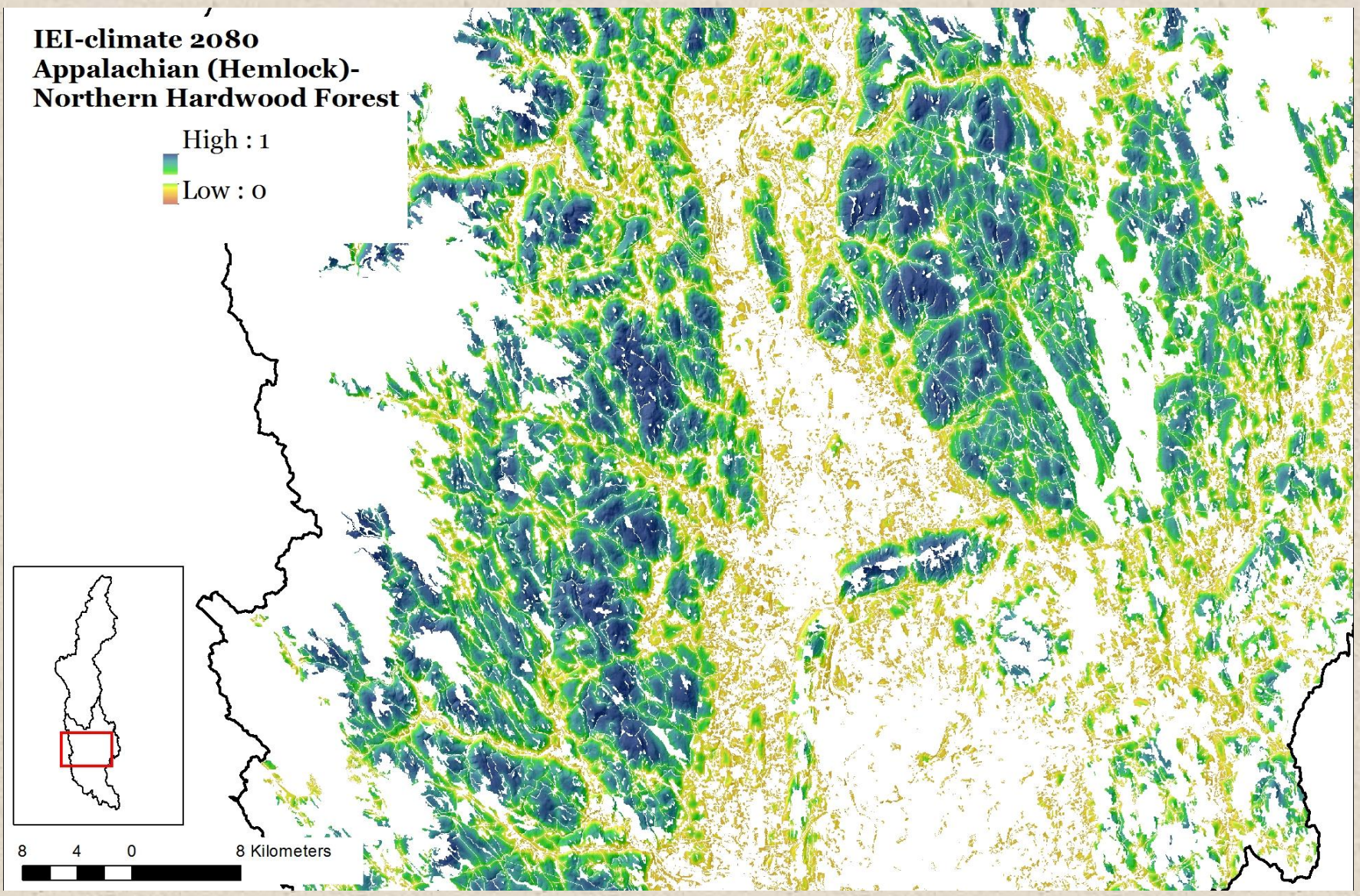
Ecosystem: IEI-climate

Climate stressor metric



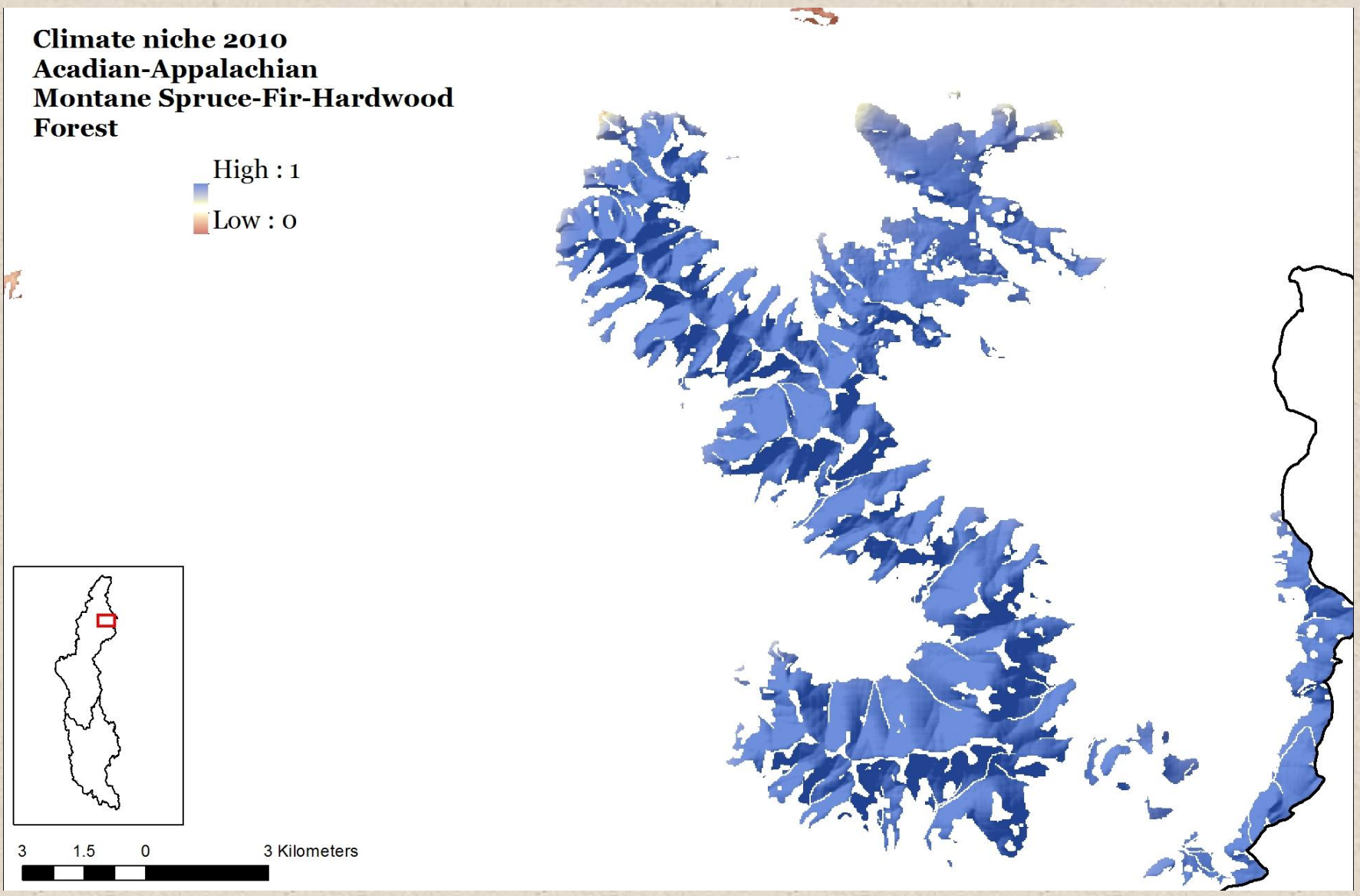
Ecosystem: IEI-climate

Climate stressor metric



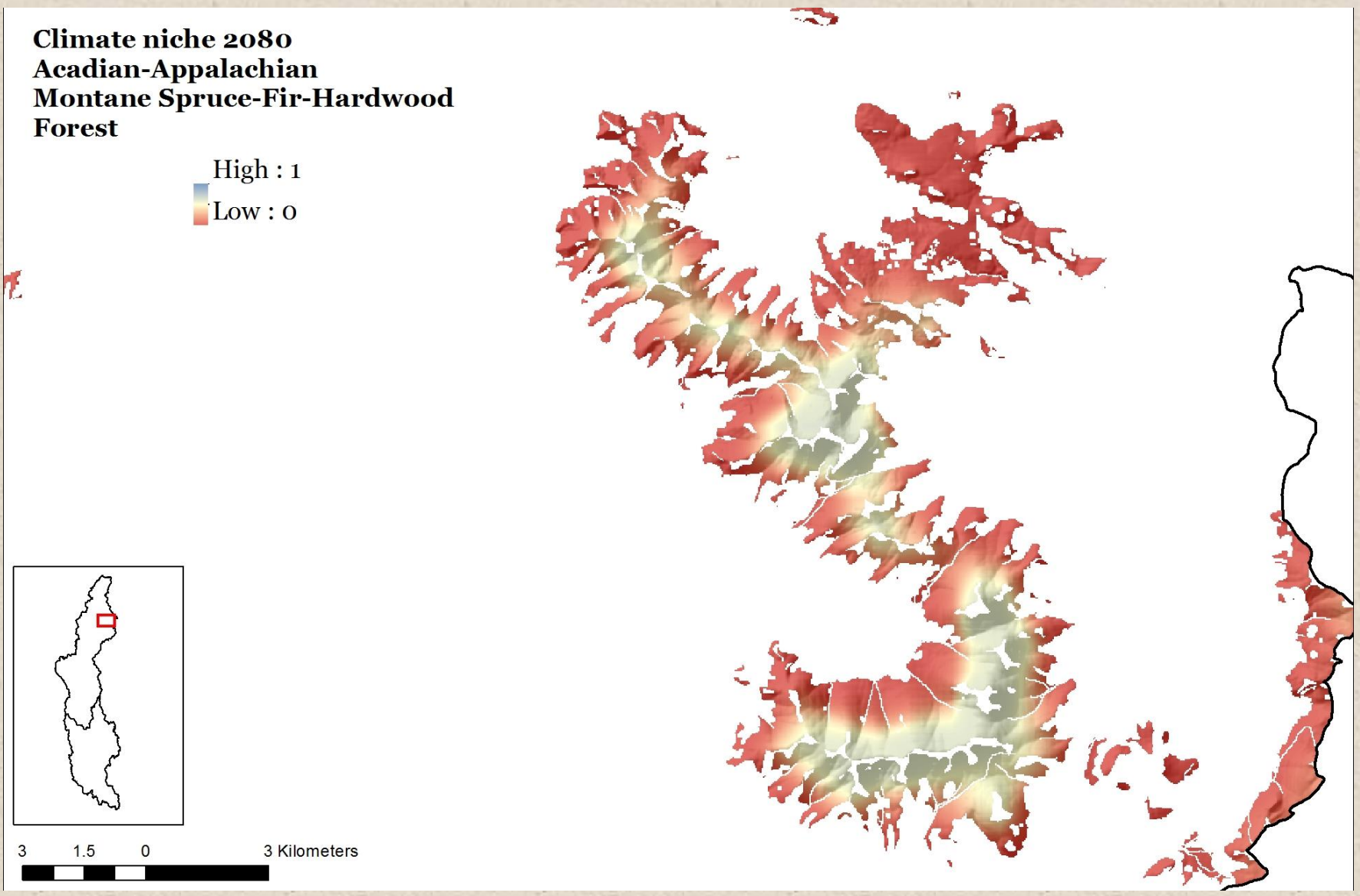
Ecosystem: IEI-climate

Climate stressor metric



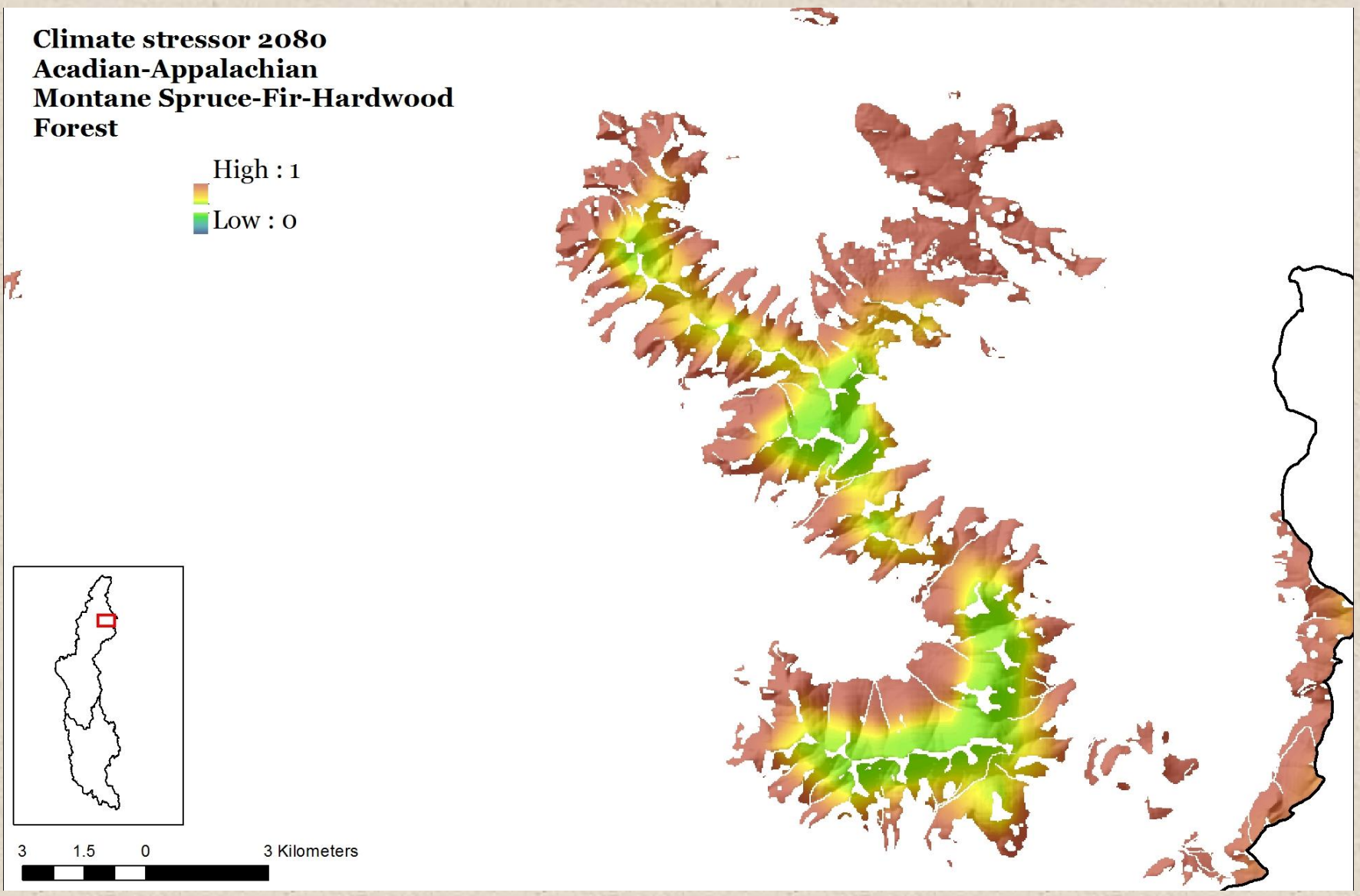
Ecosystem: IEI-climate

Climate stressor metric



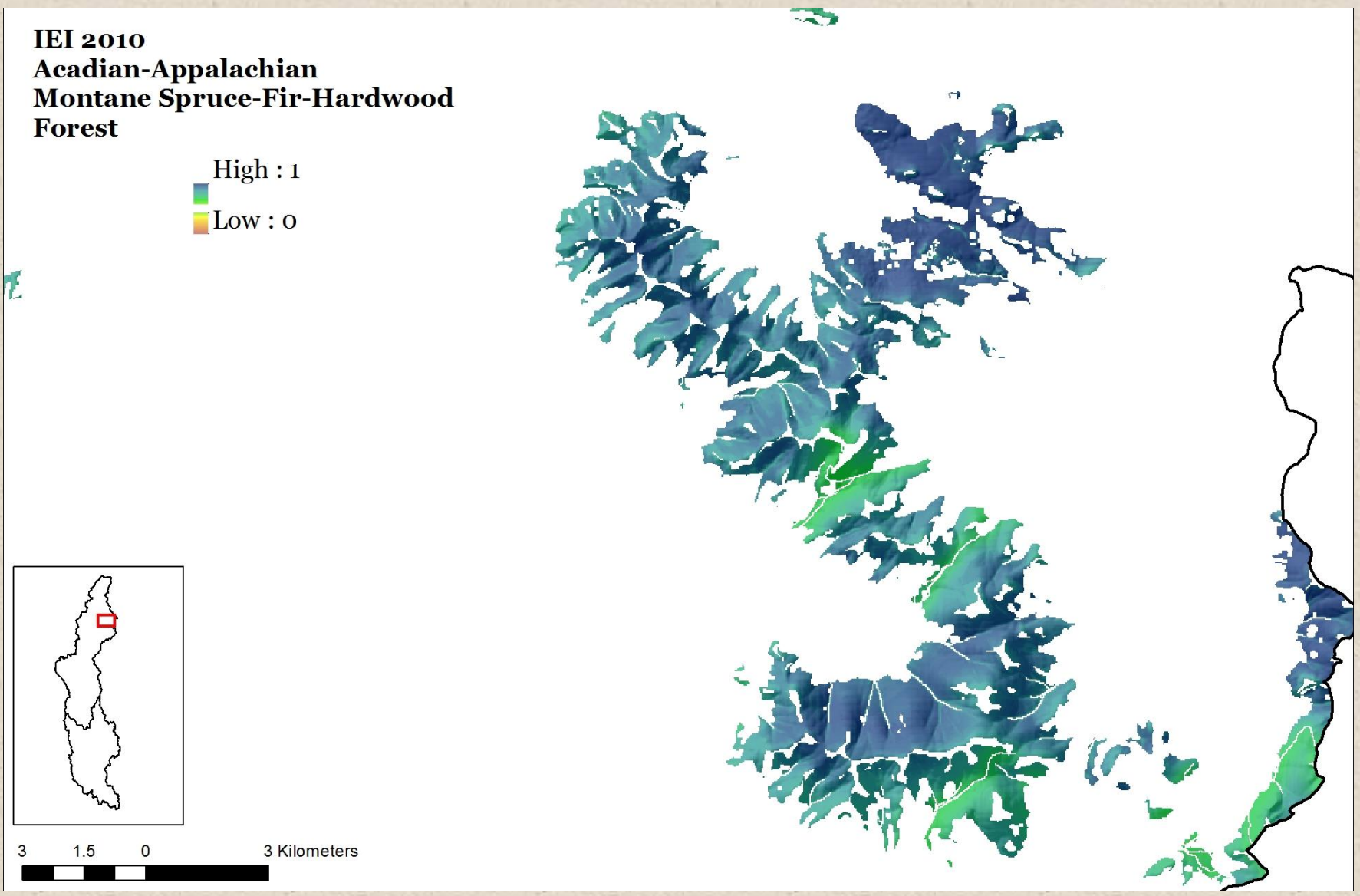
Ecosystem: IEI-climate

Climate stressor metric



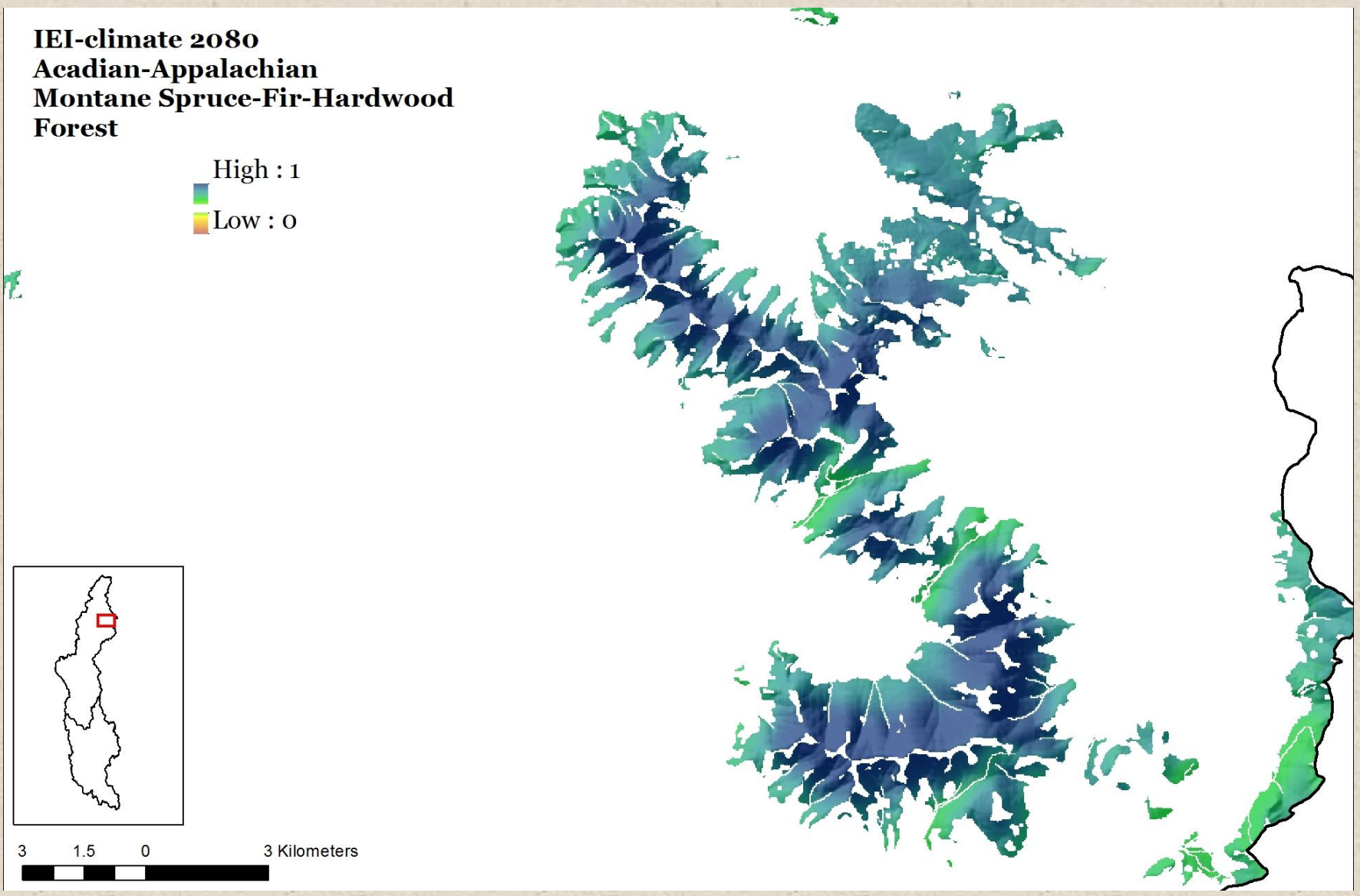
Ecosystem: IEI-climate

Climate stressor metric



Ecosystem: IEI-climate

Climate stressor metric



Ecosystem: IEI-climate

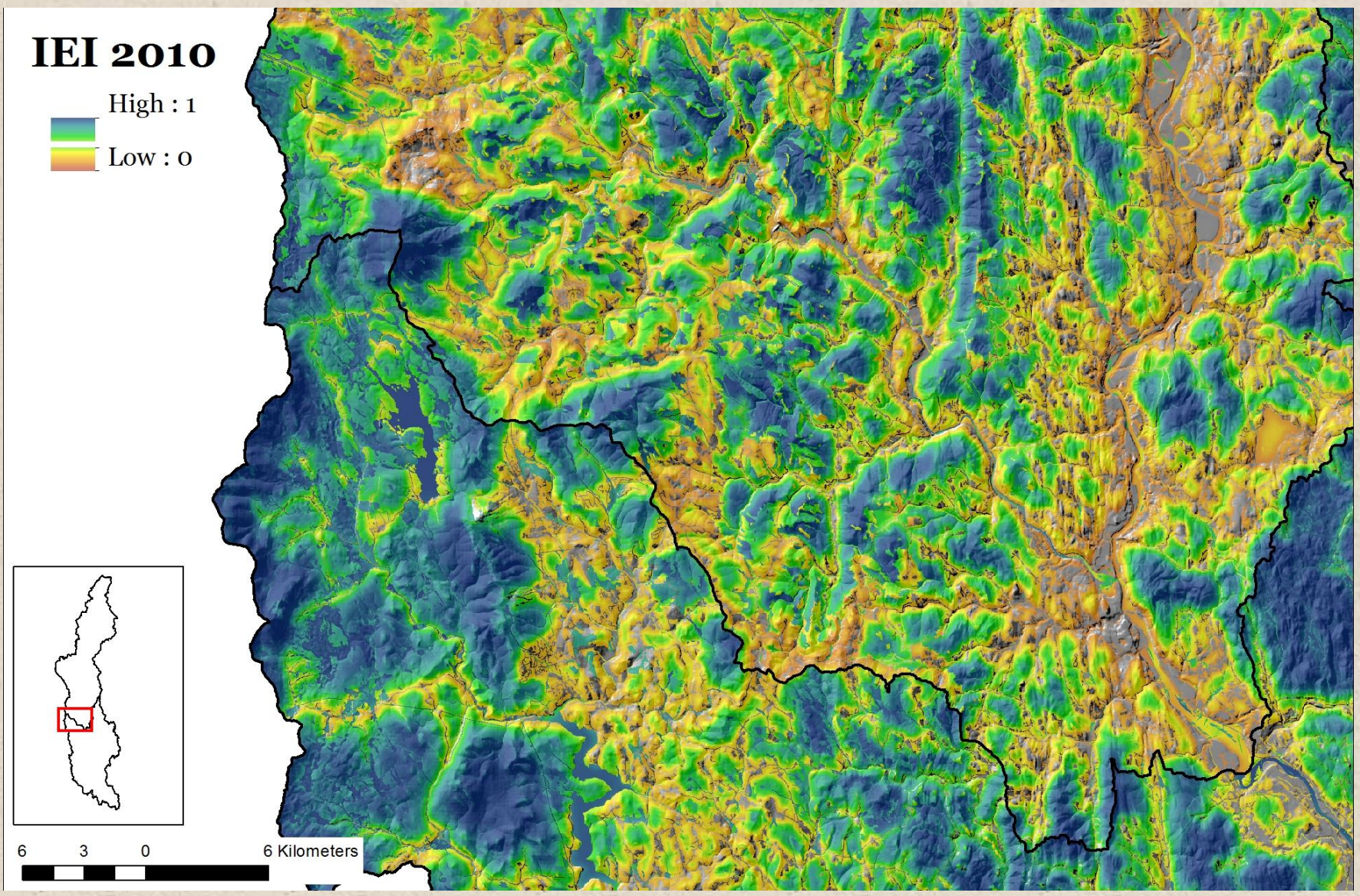
Ecological integrity models

Formation/ Macrogroup	habloss	whabloss	traffic	mowplow	edges	salt	sediment	nutrients	cats	edgepred	badplants	worms	imperv	damint	sim	connect	aqconnect	climate	searise
Alpine	0.0	0.0	5.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.4	0.0	0.0	0.0	7.1	7.1	0.0	25.0	50.0
Boreal Upland Forest - low elevation	4.5	0.0	4.5	0.0	2.3	0.0	0.0	0.0	2.3	4.5	4.5	4.5	0.0	0.0	6.8	11.3	0.0	5.0	50.0
Boreal Upland Forest - high elevation	3.5	0.0	3.5	0.0	1.8	0.0	0.0	0.0	1.8	3.5	3.5	3.5	0.0	0.0	5.3	8.8	0.0	15.0	50.0
Northeastern Upland Forest	4.5	0.0	4.5	0.0	2.3	0.0	0.0	0.0	2.3	4.5	4.5	4.5	0.0	0.0	6.8	11.3	0.0	5.0	50.0
Northeastern Wetland Forest	4.4	2.2	4.4	2.2	2.2	2.2	2.2	2.2	0.0	2.2	4.4	2.2	0.0	0.0	4.4	8.9	1.0	5.0	50.0
Headwater Creeks	2.6	5.3	2.6	2.6	2.6	0.0	2.6	2.6	0.0	2.6	0.0	0.0	5.3	7.9	0.0	5.3	7.9	0.0	50.0
Lake	2.6	10.6	2.6	2.6	0.0	2.6	2.6	5.3	0.0	2.6	0.0	0.0	2.6	0.0	5.3	5.3	5.3	0.0	50.0
Estuarine Intertidal	9.2	0.0	2.7	1.0	0.0	0.0	0.0	0.0	1.8	3.1	0.0	0.0	0.0	0.0	12.7	14.5	0.0	5.0	50.0

*Example ecological formations

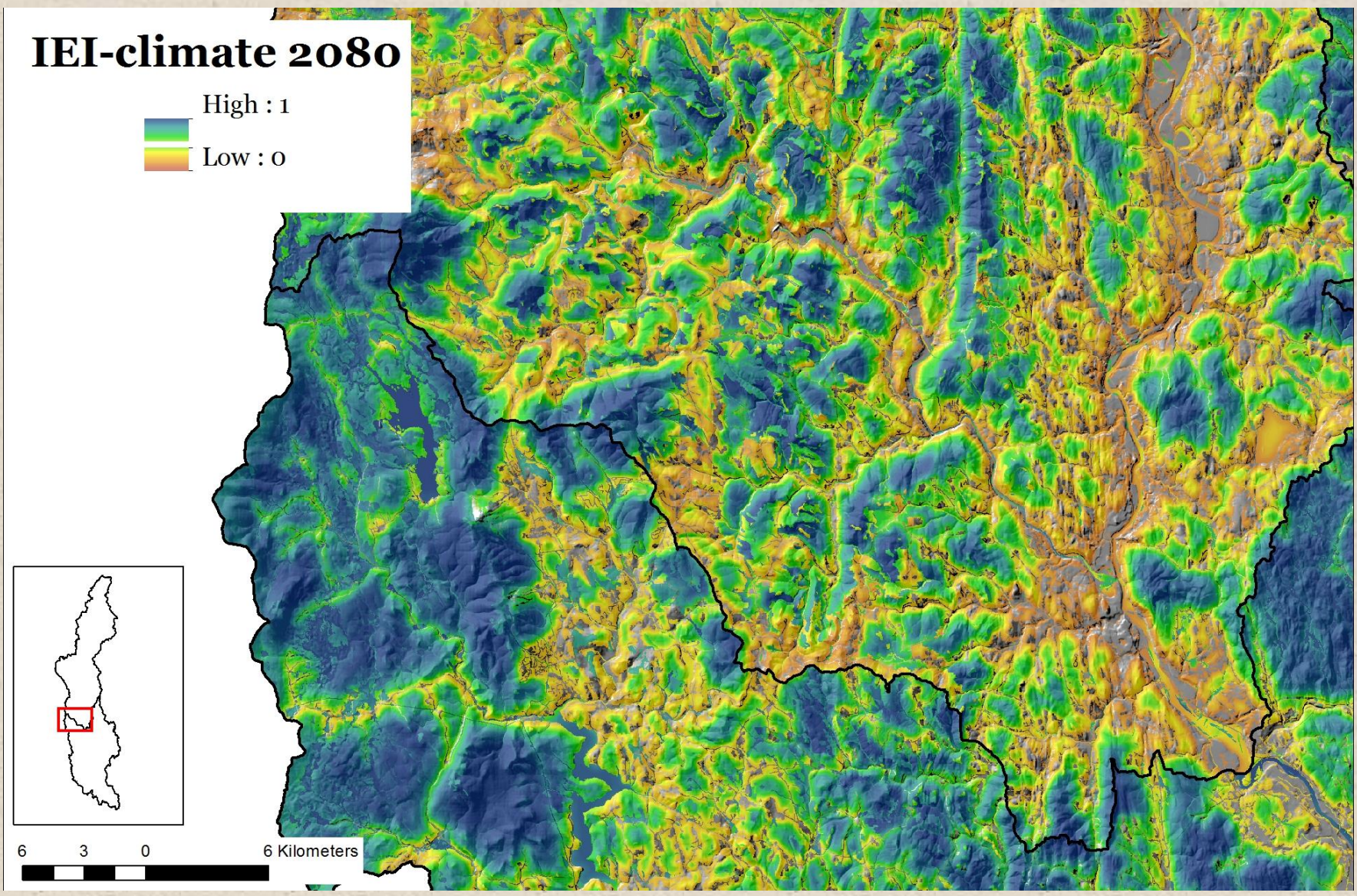
Ecosystem: IEI-climate

Example 1



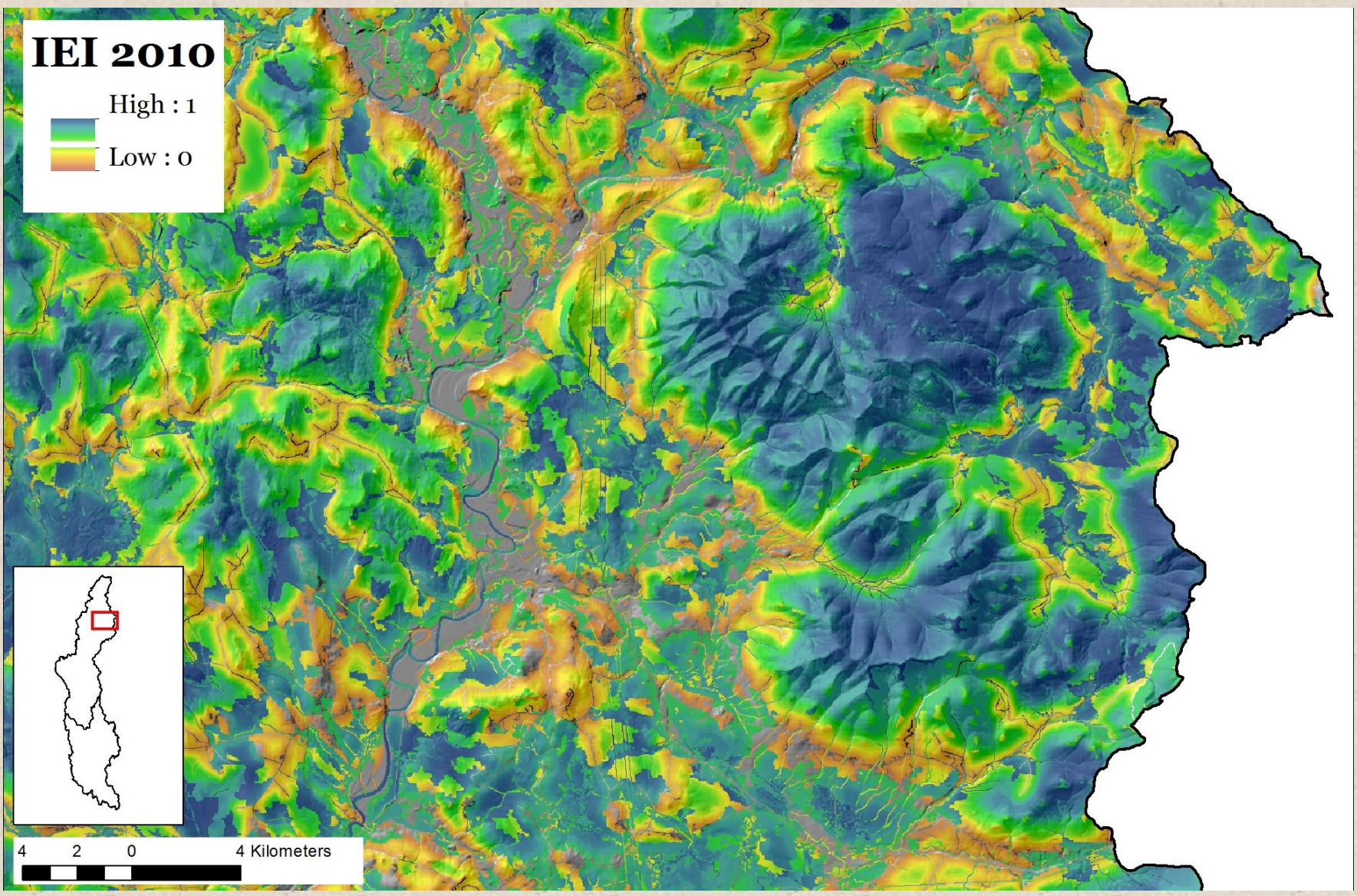
Ecosystem: IEI-climate

Example 1



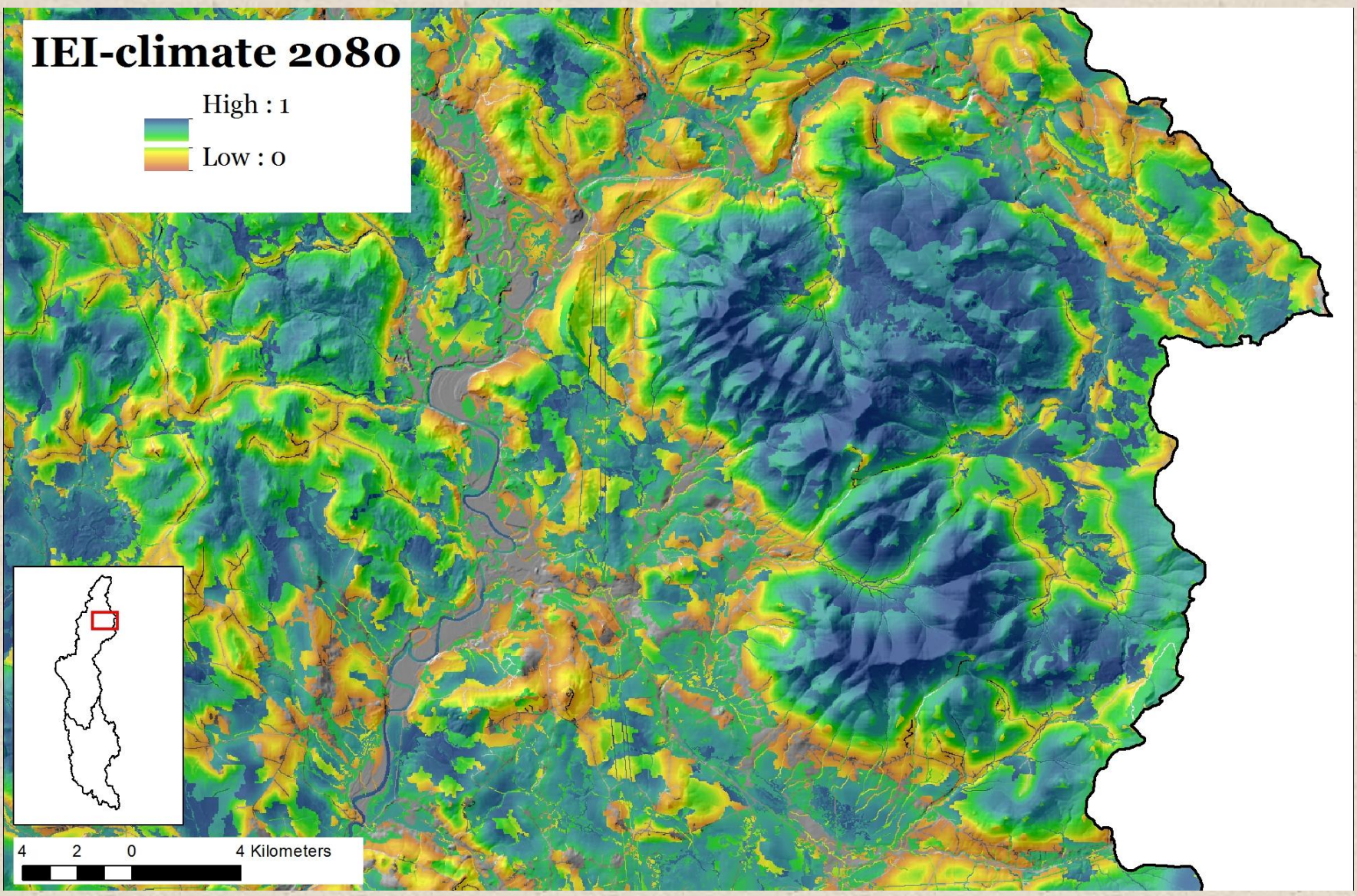
Ecosystem: IEI-climate

Example 2



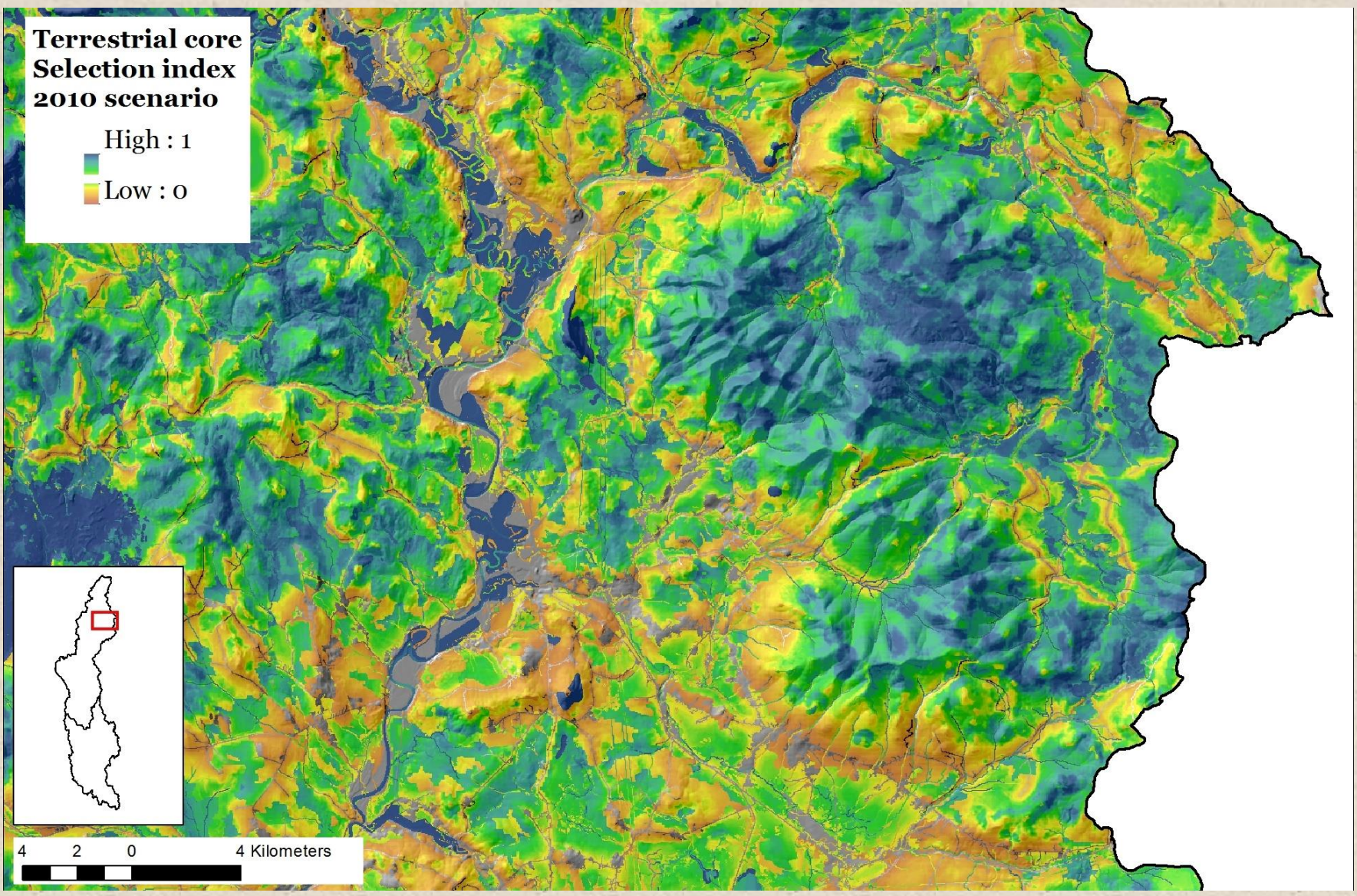
Ecosystem: IEI-climate

Example 2



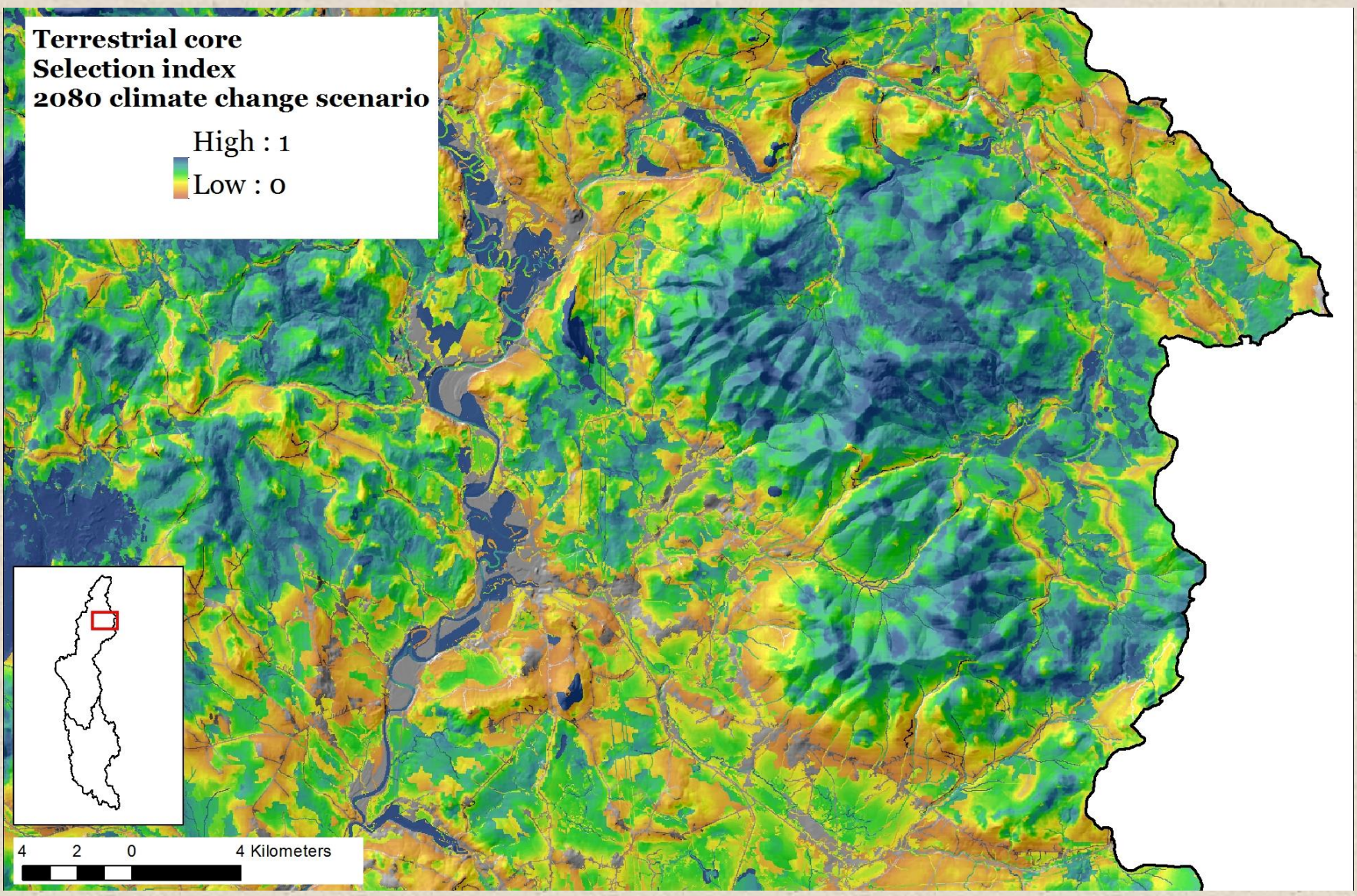
Ecosystem: terrestrial core area selection index

Example 1



Ecosystem: terrestrial core area selection index

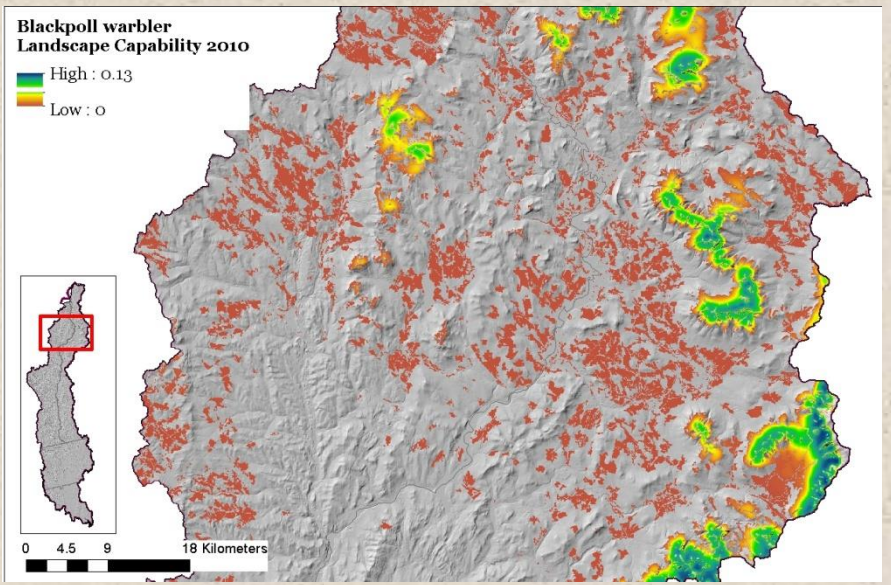
Example 1

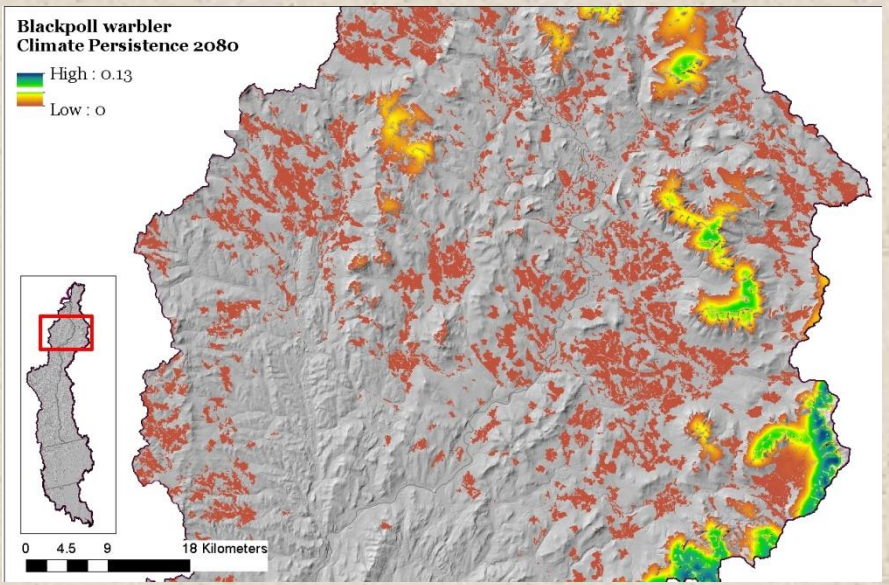


Incorporating Future Conditions

Species: Climate persistence

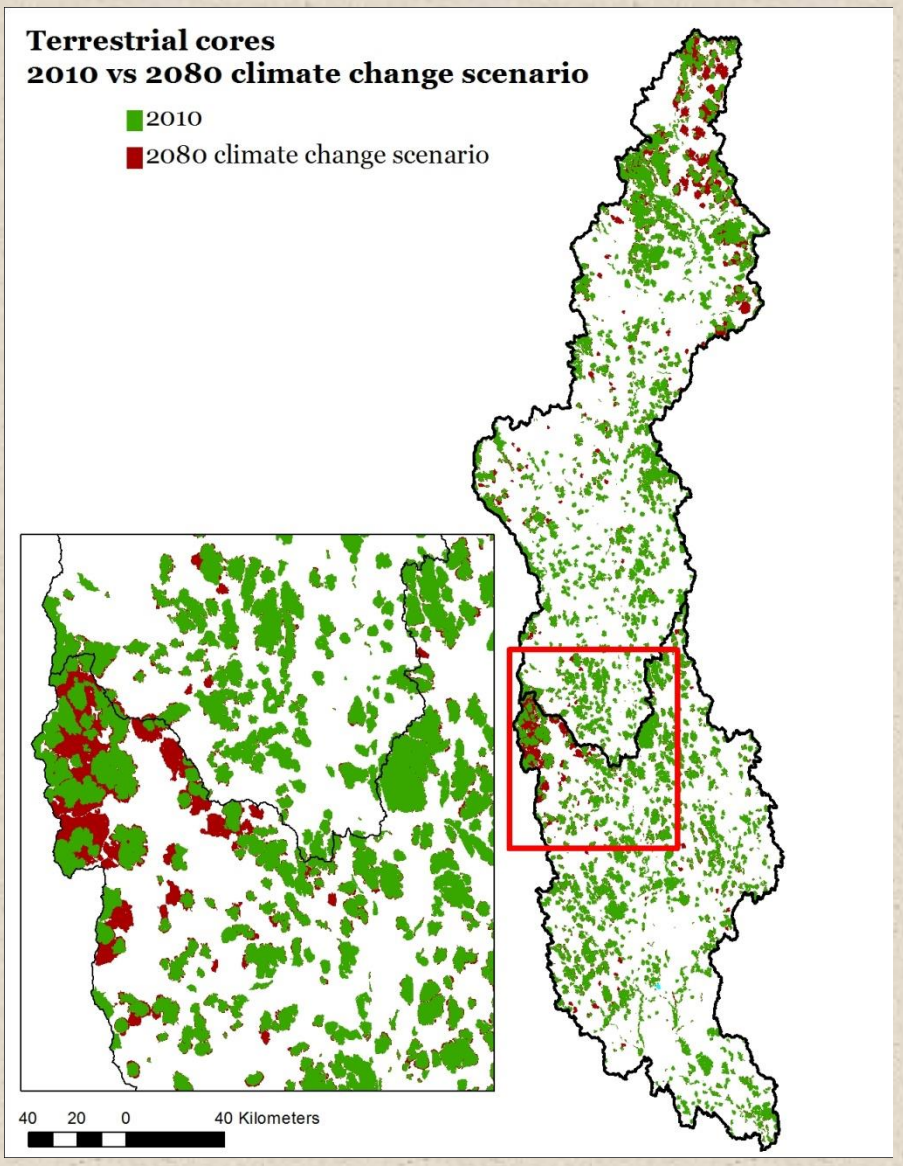
- Use climate persistence metric (average of current LC and future LC-climate)
- Use brook trout equivalent (average of current and future prob(occur))

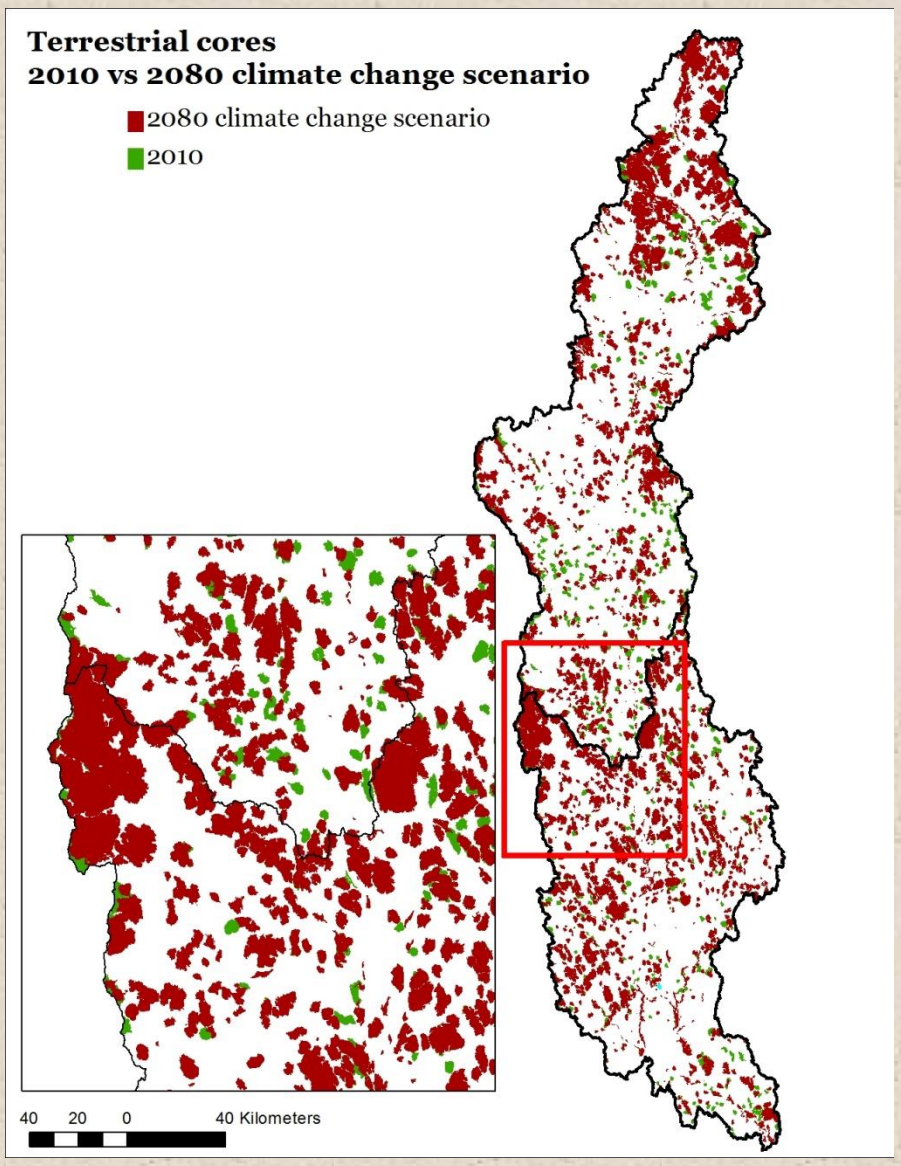




Incorporating Future Conditions

Terrestrial core areas





LCD Package: Documentation

Connecticut River Watershed Landscape Conservation Design: Spatial Data Products

March 26, 2015

Purpose

The Connecticut River Watershed Landscape Conservation Design (CTR LCD) is intended to focus conservation actions, including land protection, management, and restoration where it will likely do the most good towards conserving biodiversity within the Connecticut River watershed. The LCD provides a watershed-based conservation design to complement or supplement conservation planning done at local or finer extents. Although the LCD offers a way to strategically focus limited conservation resources, by itself it is not sufficient as a total solution to biodiversity conservation in the watershed. This design serves as a starting point that should be used in combination with other sources of information to direct conservation.

The CTR LCD is not a single product or map. Rather, it is a package of data products that collectively identify terrestrial core areas and connectors, aquatic core areas and their watershed-based buffers, and restoration opportunities for dam removal, culvert upgrades, and terrestrial wildlife road passage structures. This package also includes a variety of supporting data layers that separately provide information on the ecological value of all lands and waters regardless of their inclusion in the core area network.

The purpose of this document is to provide a brief description of the data layers included in the CTR LCD package. A separate process document is being developed to describe in detail how these data layers were created.

Disclaimer

The spatial data products comprising the CTR LCD and described in this document were produced by the UMass Designing Sustainable Landscapes (DSL) Project in collaboration with the North Atlantic LCC and the Connecticut River Watershed Landscape Conservation Design (CTR LCD) partnership, with a few exceptions, as noted below.

- These products were developed to test procedures for landscape conservation design that could be extended to the entire Northeast Region in the next phase of the DSL project. These products are now being provided to collaborating partners for review and thus should be viewed as interim pending the outcome of the review process.
- This document provides a brief abstract on each of the data products to facilitate their immediate use and interpretation by the CTR LCD partners. Complete and detailed technical documentation is available for all products at the DSL project website.
- The products described here include only those data products deemed essential to the description of the CTR LCD. A more comprehensive set of data products derived for the entire region are available via the DSL project website.

Probability of development (pDev2080)

Description

This product represents the integrated probability of development between 2010-2080 based on a custom urban growth model that accounts for the type (low intensity, medium intensity and high intensity), amount and spatial pattern of development. This index represents the probability of development occurring sometime between 2010 and 2080 at the 30 m cell level. The projected amount of development in an area is downscaled from county level forecasts based on a U.S. Forest Service 2010 Resources Planning Act (RPA) assessment. The type and pattern of development is based on models of historical development and is influenced by factors such as geophysical conditions (e.g., slope, proximity to open water), existing secured lands, and proximity to roads and urban centers.

Considerations for Using Data Layer

This layer provides a seamless and continuous representation of the integrated probability of development between 2010-2080. This product can be used in combination with any of the other design products that reveal places of high ecological value to indicate places of ecological value that are at risk of development and thus may warrant land protection. This product also can be used to identify places at risk of future development independent of designated core areas and any formal landscape conservation design. Although this index is a true probability, it is perhaps best used in a relative manner to compare values from one location to another.

Precautions apply in using this dataset:

- Probability of development is highest near existing roads in part because the urban growth model does not attempt to predict the building of major new roads and the development associated with them.
- At the 30m cell level there are known gross errors in the National Land Cover Dataset (NLCD) from which development is mapped and the probability of development is modeled. Therefore, this layer is best used as a general indication of where development is likely to occur; results at the cell level are not expected to be highly reliable.

GIS Formats and Definitions

Geotiff raster (30 m cells); cell value = probability of development; ranges from 0 (e.g., secured land, water, already developed) to a theoretical maximum of 1.

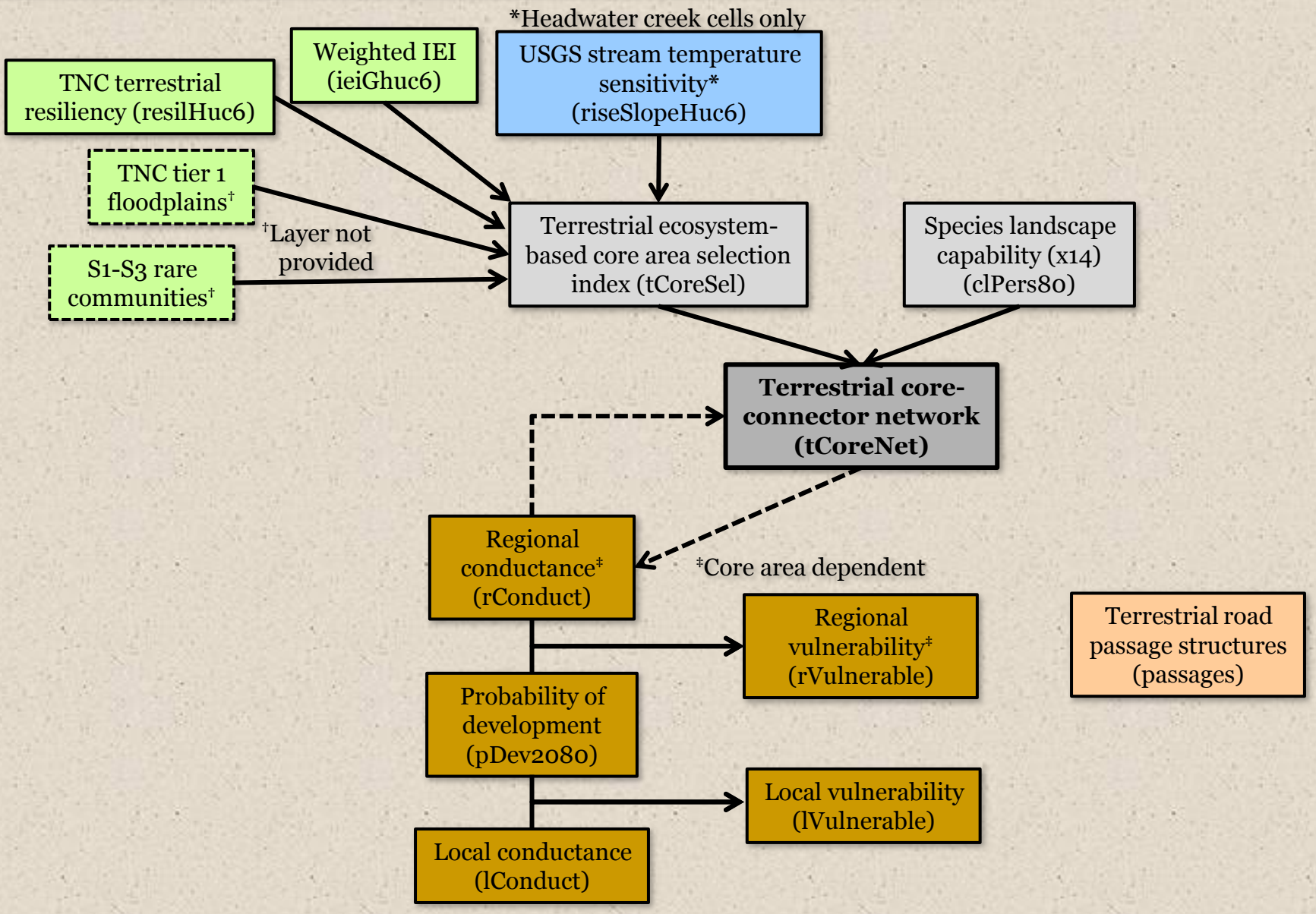
LCD Package

Terrestrial data layers

- Terrestrial core-connector network (**tCoreNet**)
- Species landscape capability (**clPers8**0 except for black bear [**lc**])
- Terrestrial ecosystem-based core area selection index (**tCoreSel**)
- USGS stream temperature sensitivity (**riseSlopeHuc6**)
- Weighted Index of Ecological Integrity (**ieiGhuc6**)
- TNC terrestrial resiliency (**resilHuc6**)
- Regional conductance (**rConduct**)
- Probability of development (**pDev2080**)
- Regional vulnerability of connectivity (**rVulnerable**)
- Local conductance (**lConduct**)
- Local vulnerability of conductance (**lVulnerable**)
- Terrestrial road passage structure impacts (**passages**)

LCD Package: Organization

Terrestrial data layers

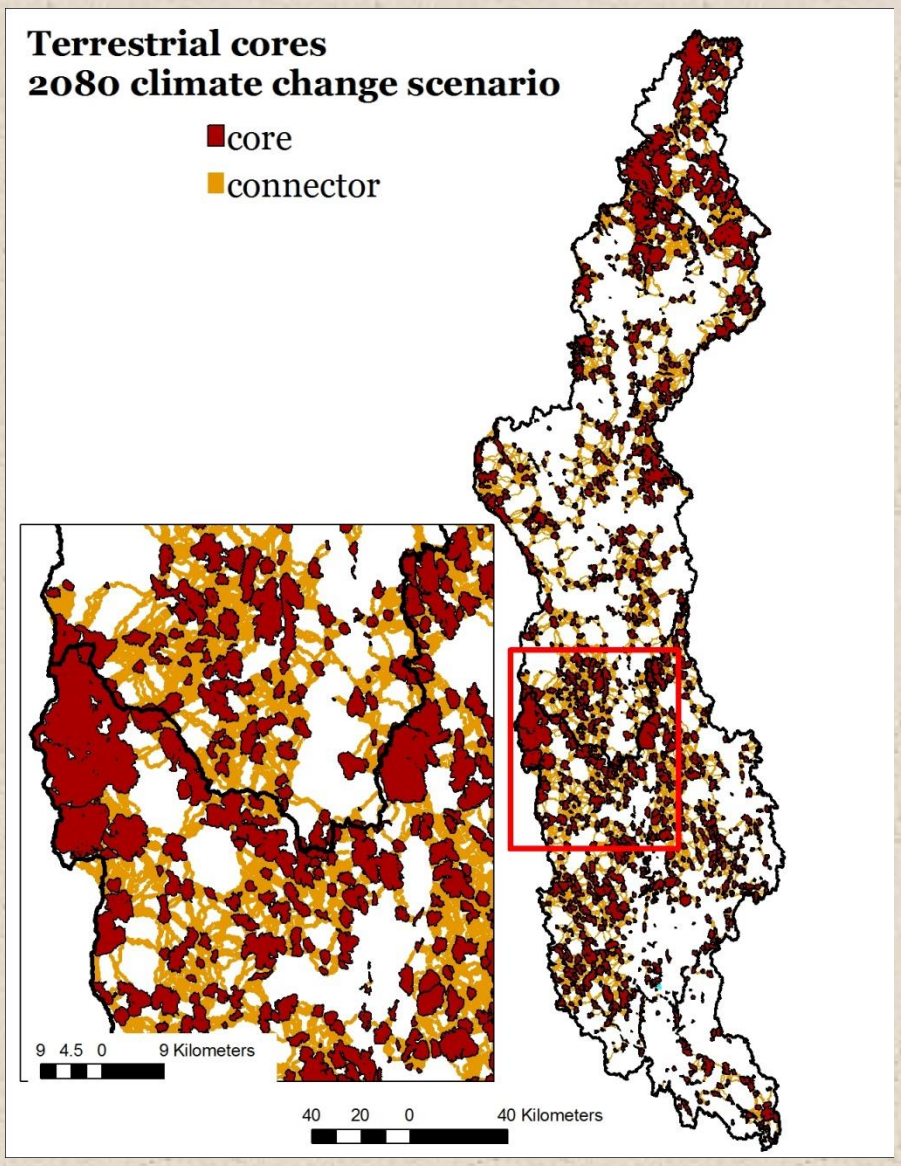


LCD Package: Use and Interpretation

Terrestrial core-connector network

tCoreNet

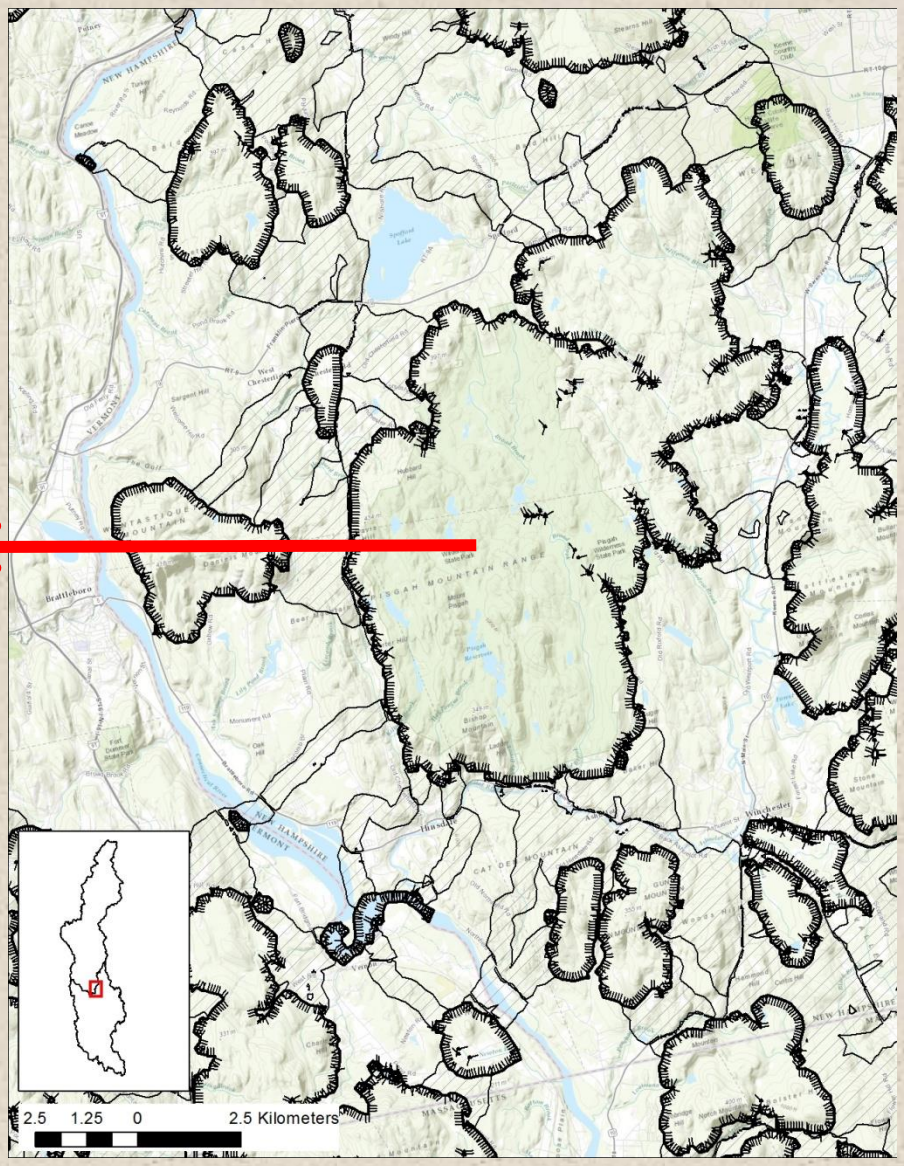
- Starting point for regional conservation network to be used with other sources of information
- Not the only places of high ecological value within the landscape
- Boundaries are "fuzzy"



LCD Package: Use and Interpretation

Terrestrial core-connector network (tCoreNet)

Field	Value
FID	512
Shape	Polygon
coreID	570007
TYPE	core
AREACOUNT	104186
AREAHA	9376.74
IEISUM	104186
IEISUMRANK	9
IMPORT10K	0.0174
IMPORTRANK	10
RELIMPORT	0.0016
RELIMPRANK	374
FLOODPLAIN	0
RARECOM	0
SYSTEM1	Appalachian (Hemlock)-Northern Hardwood Forest
SYSTEM2	Northeastern Coastal and Interior Pine-Oak Forest
SYSTEM3	Laurentian-Acadian Freshwater Marsh
SPECIES1	Wood duck
SPECIES2	Wood thrush
SPECIES3	Louisiana waterthrush
CENTROIDX	1896668.265
CENTROIDY	2442629.696
SCENARIO	Z:/LCC/GIS/Final/LCD/combined/Jan2015/future/Conc



LCD Package: Use and Interpretation

Terrestrial core-connector network (tCoreNet)

- Ecosystem composition indices

systemName	area Count	areaHa	index1	index1 Rank	index2	index2 Rank	index3	index3 Rank	index4	index4 Rank
Pond	1,373	123.6	4.21	69	1.50	99	5.72	1	0.061	119
Appalachian (Hemlock)-Northern Hardwood Forest	73,444	6,610.0	3.08	107	71.16	171	4.18	1	0.021	27
Northeastern Coastal and Interior Pine-Oak Forest	1,034	93.1	2.82	50	0.93	53	3.83	8	0.016	19
Laurentian-Acadian Freshwater Marsh	1,153	103.8	2.31	137	1.20	163	3.13	2	0.015	133
Laurentian-Acadian Pine-Hemlock-Hardwood Forest	18,315	1,648.4	2.02	229	17.84	263	2.75	2	0.025	23
Central Appalachian Pine-Oak Rocky Woodland	605	54.5	1.84	156	0.58	167	2.50	3	0.013	81
Stream (headwater/creek) cold moderate	558	50.2	1.63	197	0.48	246	2.22	8	0.015	230
Stream (headwater/creek) cold low	245	22.1	1.61	213	0.20	243	2.18	6	0.013	221
Laurentian-Acadian Wet Meadow-Shrub Swamp	1,356	122.0	1.58	220	1.45	257	2.14	7	0.021	156
Lake	858	77.2	1.34	91	0.93	98	1.81	14	0.048	4
Stream (headwater/creek) cool high	146	13.1	1.24	168	0.09	177	1.68	12	-0.041	150
Ruderal Shrub Swamp	13	1.2	1.23	58	0.02	58	1.67	21	0.152	8
Stream (headwater/creek) cool moderate	50	4.5	1.19	162	0.05	165	1.61	6	0.068	55
Stream (headwater/creek) cold high	1,682	151.4	0.91	284	1.40	355	1.24	14	-0.001	244
North-Central Appalachian Acidic Swamp	1,064	95.8	0.83	278	1.05	291	1.12	19	0.015	131
Shrubland & grassland (NLCD 52/71)	211	19.0	0.76	193	0.17	196	1.03	29	-0.015	127
Northern Appalachian-Acadian Conifer-Hardwood Acidic Swamp	558	50.2	0.43	193	0.56	202	0.59	25	0.026	55
Stream (headwater/creek) cool low	29	2.6	0.40	207	0.03	208	0.54	59	0.059	69
Central Appalachian Dry Oak-Pine Forest	316	28.4	0.31	249	0.28	257	0.42	68	-0.007	161
North-Central Interior and Appalachian Acidic Peatland	14	1.3	0.22	21	0.00	21	0.30	20	-0.164	20
Acidic Cliff and Talus	67	6.0	0.19	206	0.08	212	0.26	79	0.064	17
Boreal-Laurentian-Acadian Acidic Basin Fen	8	0.7	0.03	85	0.01	85	0.04	70	-0.001	51

LCD Package: Use and Interpretation

Terrestrial core-connector network (tCoreNet)

- Index 1= deviation from expected (>1 is good)

systemName	area Count	areaHa	index1	index1Rank	index2	index2Rank	index3	index3Rank	index4	index4Rank
Appalachian (Hemlock)-Northern Hardwood Forest	73,444	6,610.0	3.08	107	71.16	171	4.18	1	0.021	27
Northeastern Coastal and Interior Pine-Oak Forest	1,034	93.1	2.82	50	0.93	53	3.83	8	0.016	19
Laurentian-Acadian Freshwater Marsh	1,153	103.8	2.31	137	1.20	163	3.13	2	0.015	133

LCD Package: Use and Interpretation

Terrestrial core-connector network (tCoreNet)

- Index 2 = % of focal core selection index

systemName	area Count	areaHa	index1	index1Rank	index2	index2Rank	index3	index3Rank	index4	index4Rank
Appalachian (Hemlock)-Northern Hardwood Forest	73,444	6,610.0	3.08	107	71.16	171	4.18	1	0.021	27
Northeastern Coastal and Interior Pine-Oak Forest	1,034	93.1	2.82	50	0.93	53	3.83	8	0.016	19
Laurentian-Acadian Freshwater Marsh	1,153	103.8	2.31	137	1.20	163	3.13	2	0.015	133

LCD Package: Use and Interpretation

Terrestrial core-connector network (tCoreNet)

- Index 3 = % of total core area selection index in focal core

systemName	area Count	areaHa	index1	index1Rank	index2	index2Rank	index3	index3Rank	index4	index4Rank
Appalachian (Hemlock)-Northern Hardwood Forest	73,444	6,610.0	3.08	107	71.16	171	4.18	1	0.021	27
Northeastern Coastal and Interior Pine-Oak Forest	1,034	93.1	2.82	50	0.93	53	3.83	8	0.016	19
Laurentian-Acadian Freshwater Marsh	1,153	103.8	2.31	137	1.20	163	3.13	2	0.015	133

LCD Package: Use and Interpretation

Terrestrial core-connector network (tCoreNet)

- Index 4 = difference between average selection index in focal core and across all cores (+ is better than average)

systemName	area Count	areaHa	index1	index1Rank	index2	index2Rank	index3	index3Rank	index4	index4Rank
Appalachian (Hemlock)-Northern Hardwood Forest	73,444	6,610.0	3.08	107	71.16	171	4.18	1	0.021	27
Northeastern Coastal and Interior Pine-Oak Forest	1,034	93.1	2.82	50	0.93	53	3.83	8	0.016	19
Laurentian-Acadian Freshwater Marsh	1,153	103.8	2.31	137	1.20	163	3.13	2	0.015	133

LCD Package: Use and Interpretation

Terrestrial core-connector network (tCoreNet)

- Species composition indices

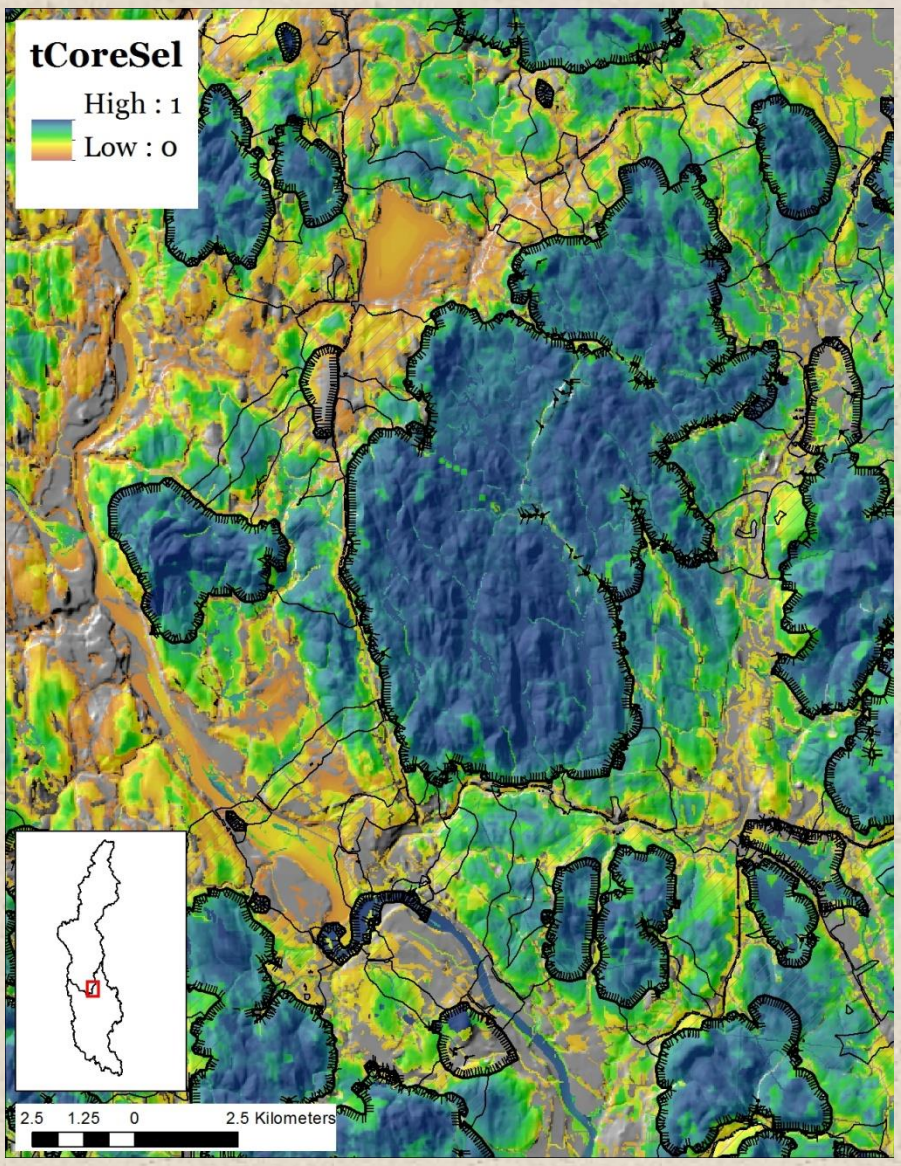
speciesName	sumLC	index1	Index1 Rank	index2	Index2 Rank	index3	Index3 Rank	index4	Index4 Rank
Wood duck	93	1.46	217	0.07	332	2.00	7	0.00	217
Wood thrush	44591	1.39	226	34.54	249	1.90	6	0.12	226
Louisiana waterthrush	152	1.19	283	0.12	402	1.63	3	0.00	283
Marsh wren	98	1.06	199	0.08	249	1.45	12	0.00	199
Black bear	57119	0.98	310	44.24	620	1.34	10	-0.01	310
Moose	15061	0.68	363	11.67	451	0.93	18	-0.07	363
Ruffed grouse	7797	0.55	472	6.04	602	0.76	22	-0.06	472
Wood turtle	254	0.52	403	0.20	433	0.72	20	0.00	403
American woodcock	1726	0.44	559	1.34	747	0.60	27	-0.02	559
Blackburnian warbler	2124	0.41	460	1.65	525	0.56	29	-0.03	460
Prairie warbler	1	0.33	306	0.00	370	0.45	33	0.00	306
Northern waterthrush	89	0.15	448	0.07	542	0.20	46	-0.01	448
Eastern meadowlark	2	0.01	512	0.00	521	0.02	234	0.00	512

LCD Package: Use and Interpretation

Terrestrial eco core area sel index (tCorSel)

tCoreSel

- Integration of IEI, TNC resiliency, stream temperature sensitivity, tier 1 floodplains and rare communities
- Scaled by HUC6
- Seamless and continuous valuation of ecological value (inside and outside cores)

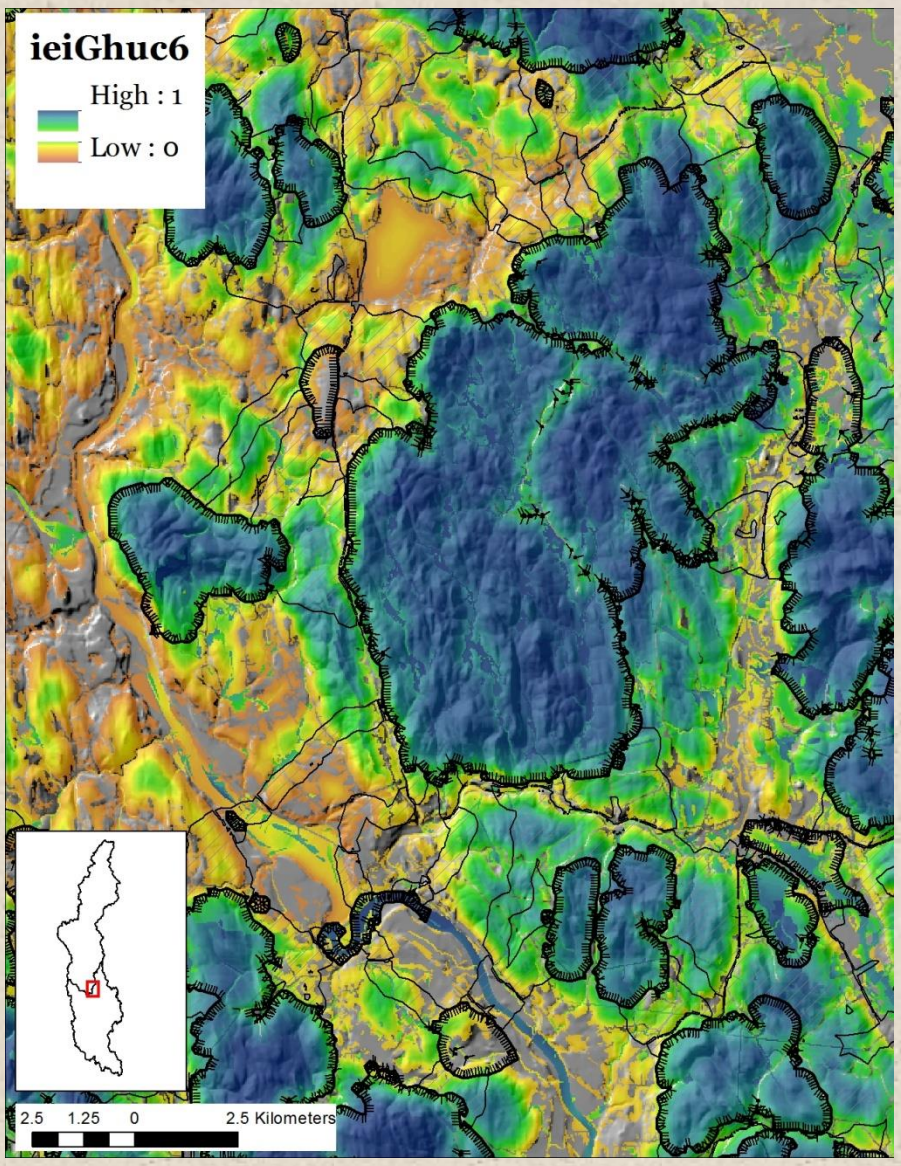


LCD Package: Use and Interpretation

Weighted IEI (ieiGhuc6)

ieiGhuc6

- Composite of multiple measures of intactness and short-term resiliency
- Weighted ecological systems
- Scaled by ecological system and HUC6
- Seamless and continuous valuation of ecological value (inside and outside cores)

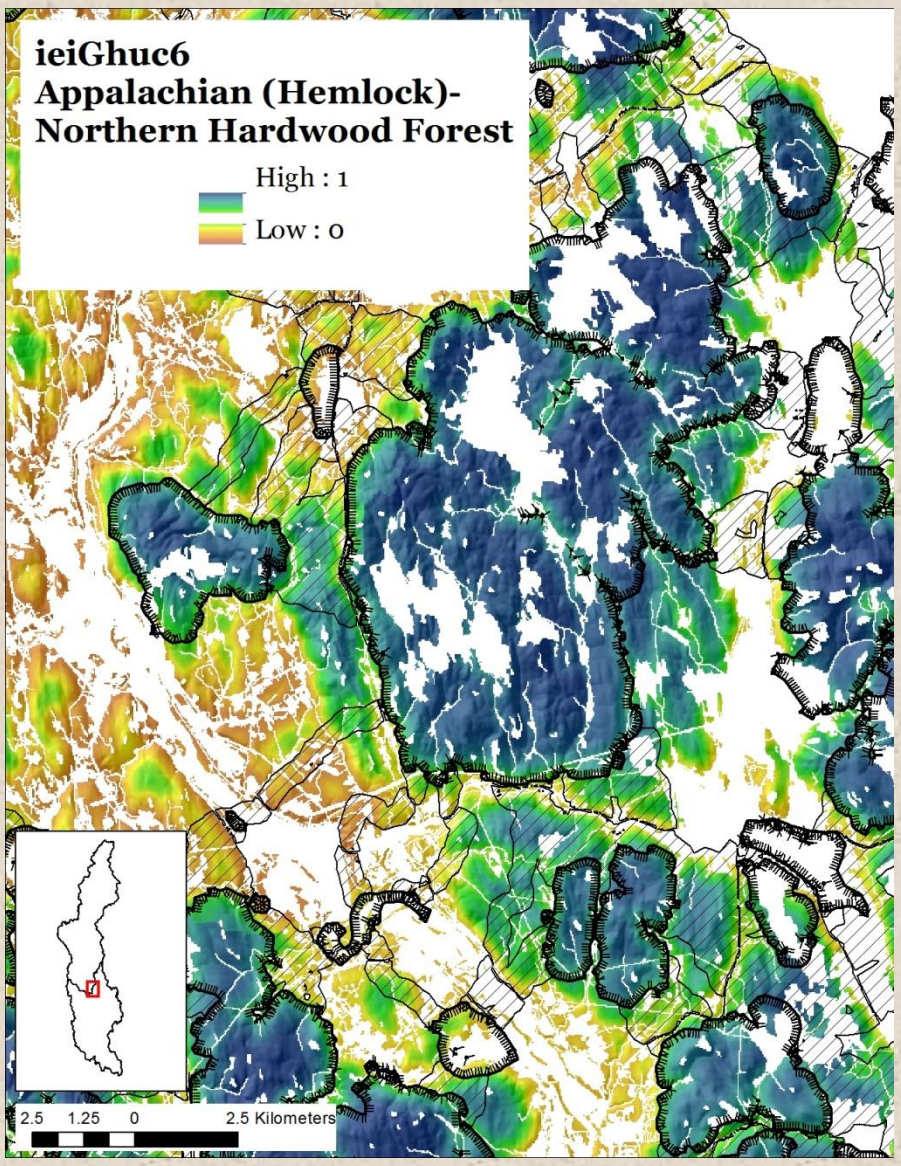


LCD Package: Use and Interpretation

Weighted IEI (ieiGhuc6)

ieiGhuc6

- Composite of multiple measures of intactness and short-term resiliency
- Weighted ecological systems
- Scaled by ecological system and HUC6
- Seamless and continuous valuation of ecological value (inside and outside cores)

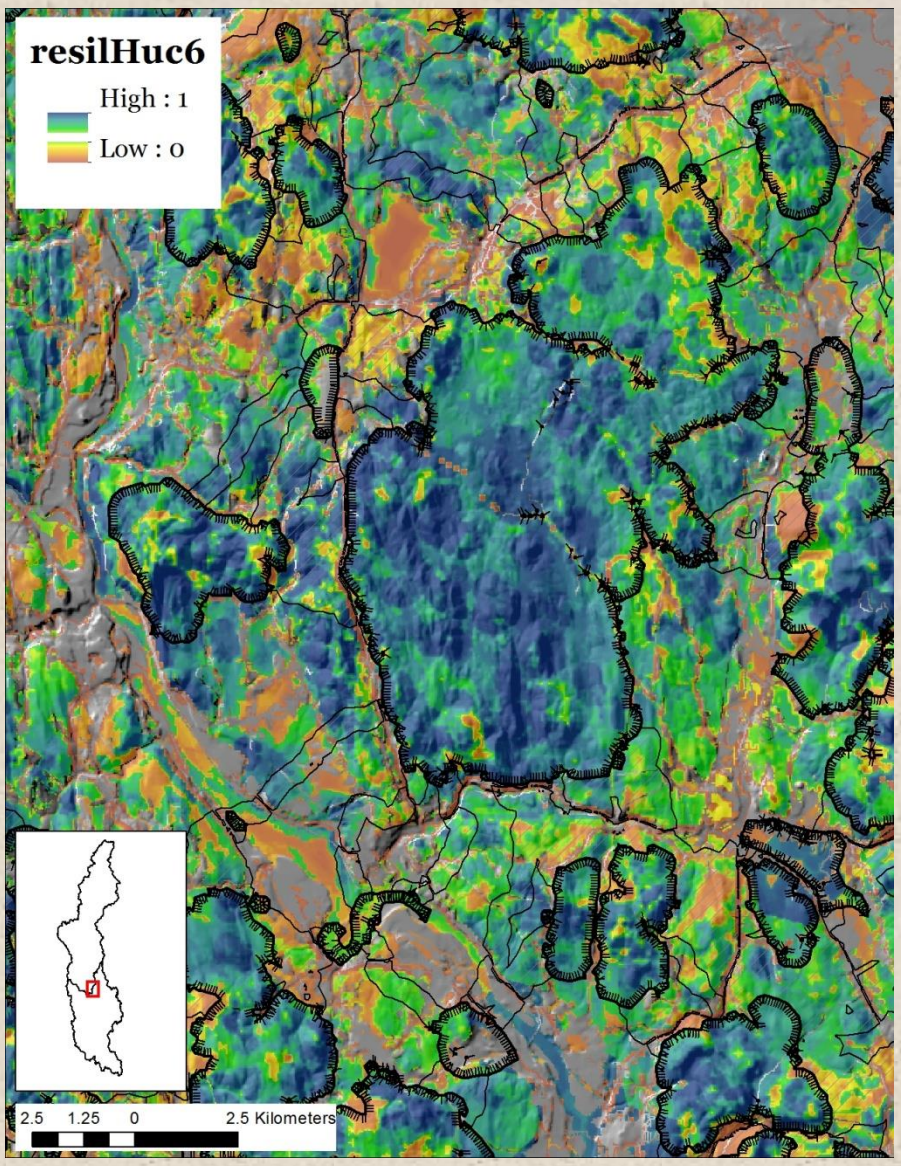


LCD Package: Use and Interpretation

TNC terrestrial resiliency (resilHuc6)

resilHuc6

- Composite of a few measures of long-term resiliency
- Scaled by geophysical class and HUC6
- Seamless and continuous valuation of ecological value (inside and outside cores)

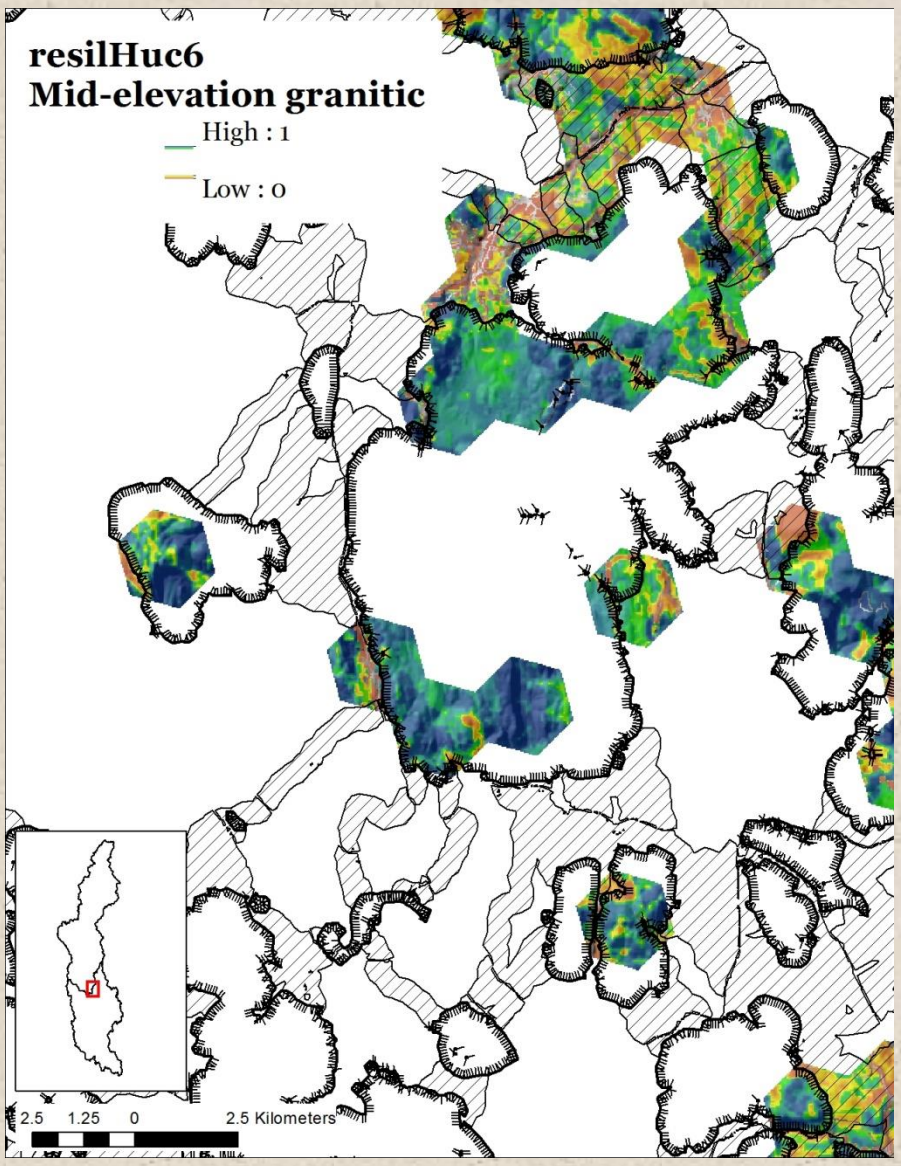


LCD Package: Use and Interpretation

TNC terrestrial resiliency (resilHuc6)

resilHuc6

- Composite of a few measures of long-term resiliency
- Scaled by geophysical class and HUC6
- Seamless and continuous valuation of ecological value (inside and outside cores)

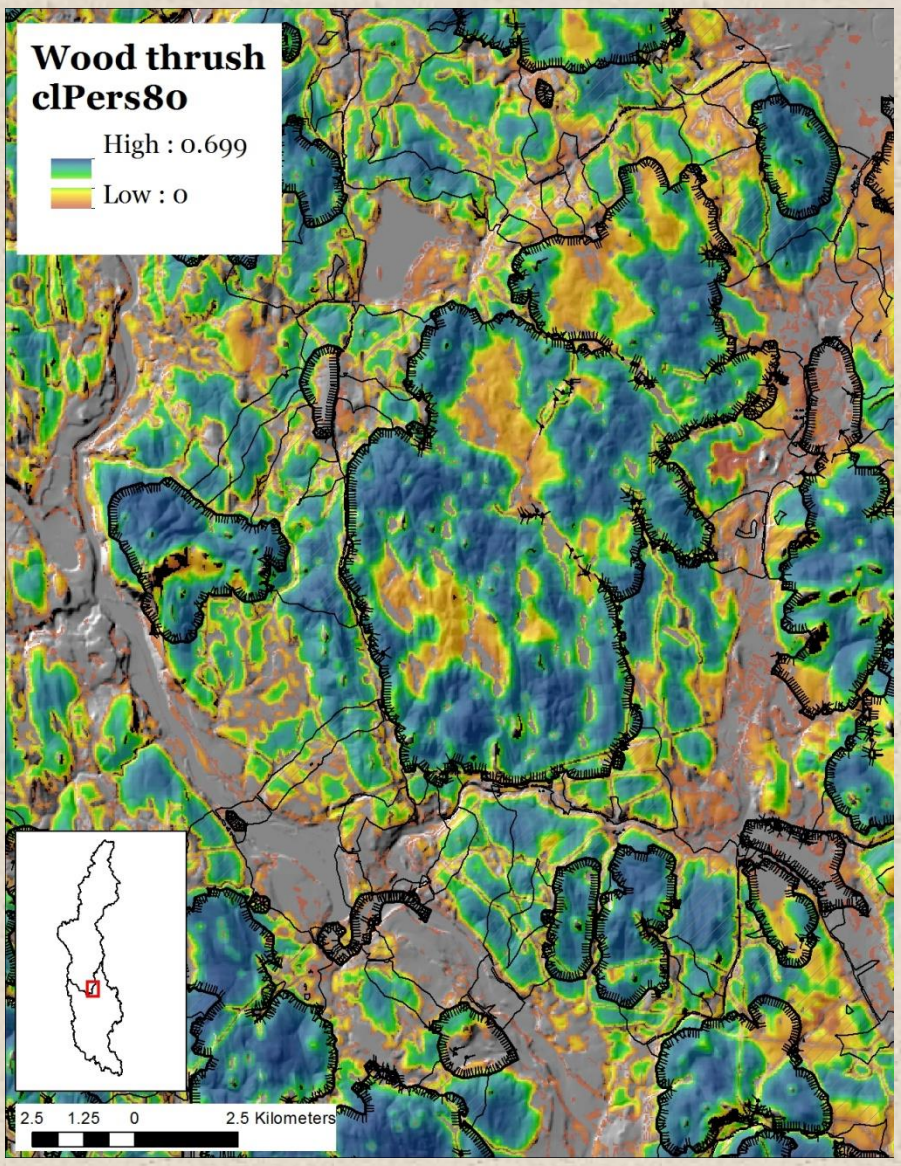


LCD Package: Use and Interpretation

Climate persistence (clPers80)

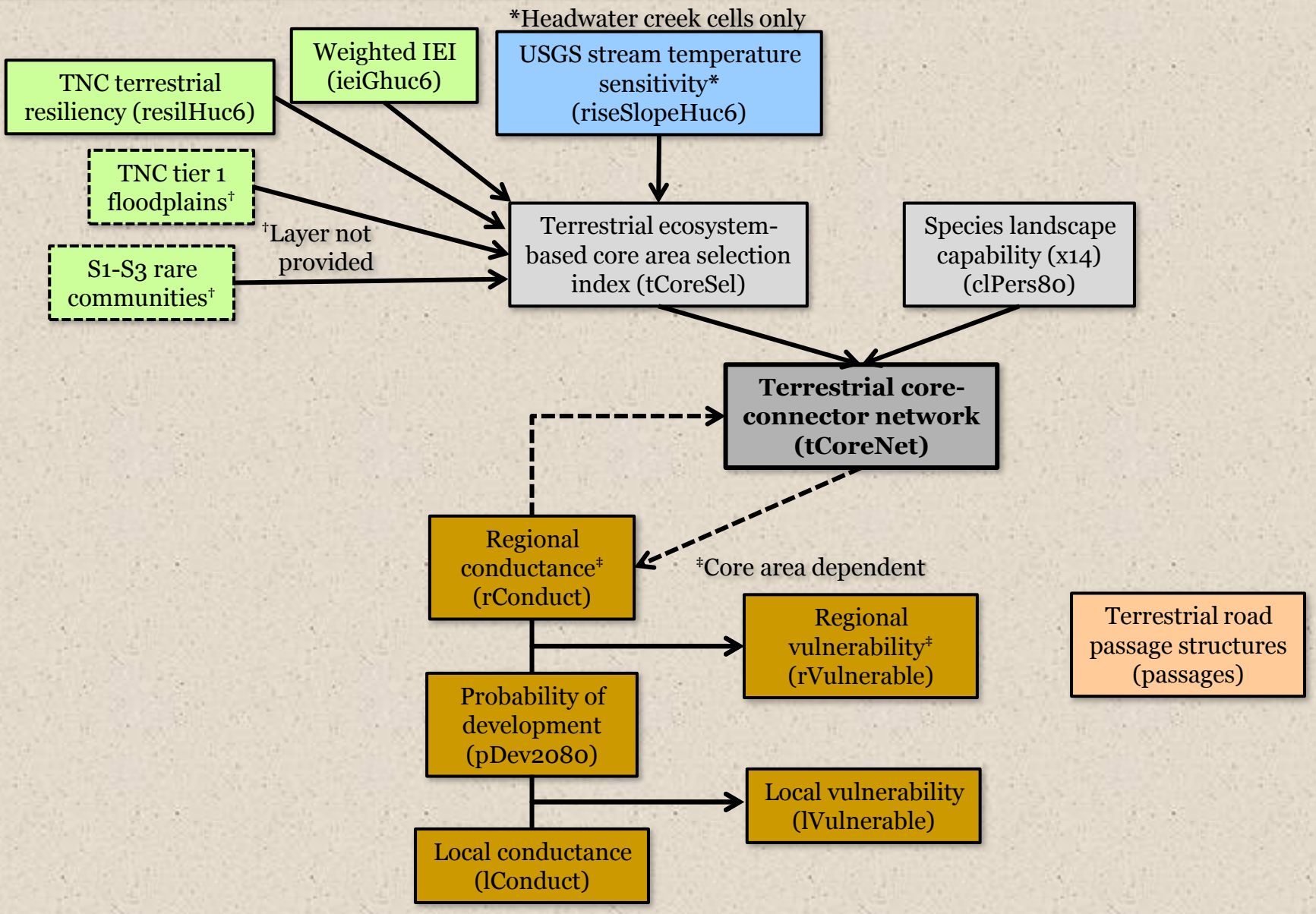
clPers80

- Average of LC and LC-climate 2080
- Distribution of values varies among species
- Not comparable across species
- Seamless and continuous valuation of ecological value (inside and outside cores)



LCD Package: Organization

Terrestrial data layers

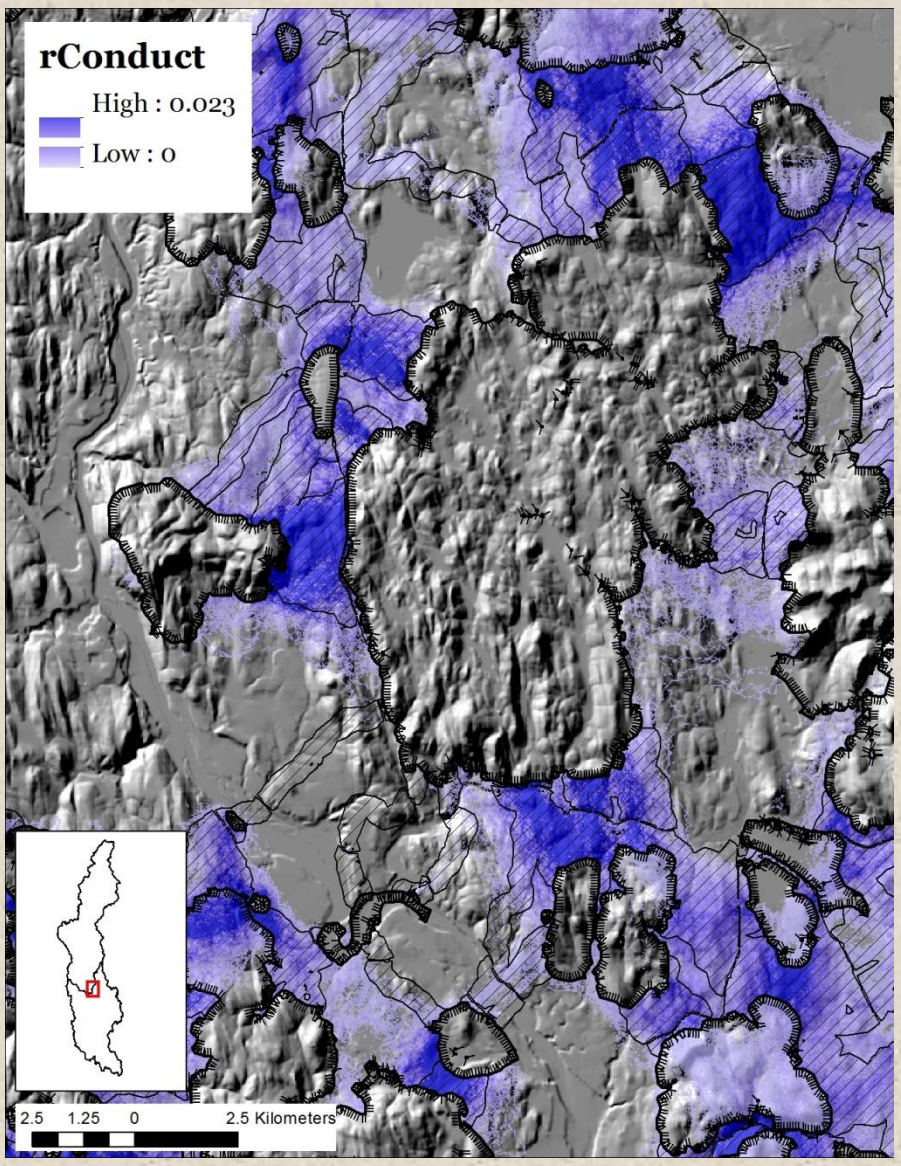


LCD Package: Use and Interpretation

Regional conductance (rConduct)

rConduct

- Relative magnitude of ecological flow between terrestrial cores (up to 10 km)
- Dependent on designated cores
- Not focal species based

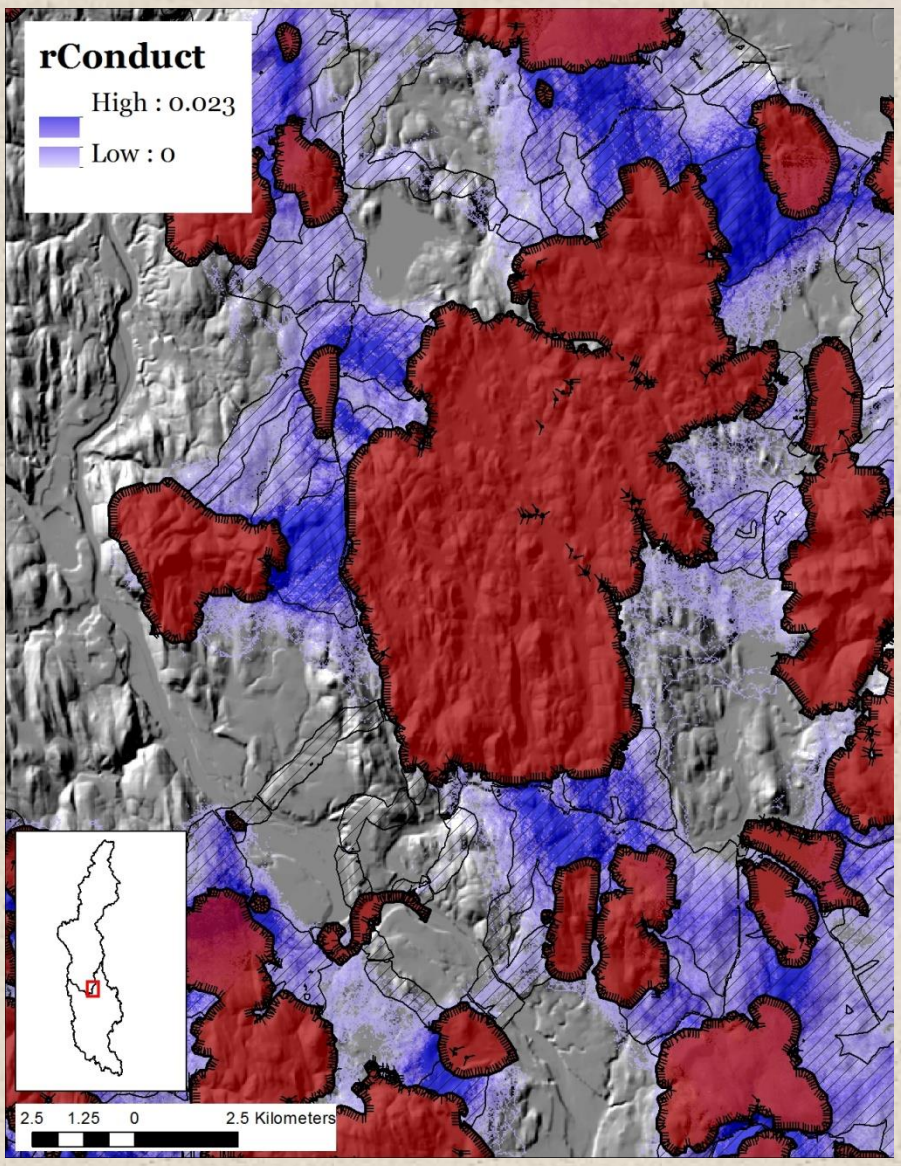


LCD Package: Use and Interpretation

Regional conductance (rConduct)

rConduct

- Relative magnitude of ecological flow between terrestrial cores (up to 10 km)
- Dependent on designated cores
- Not focal species based
- Best used to assess connectivity between cores

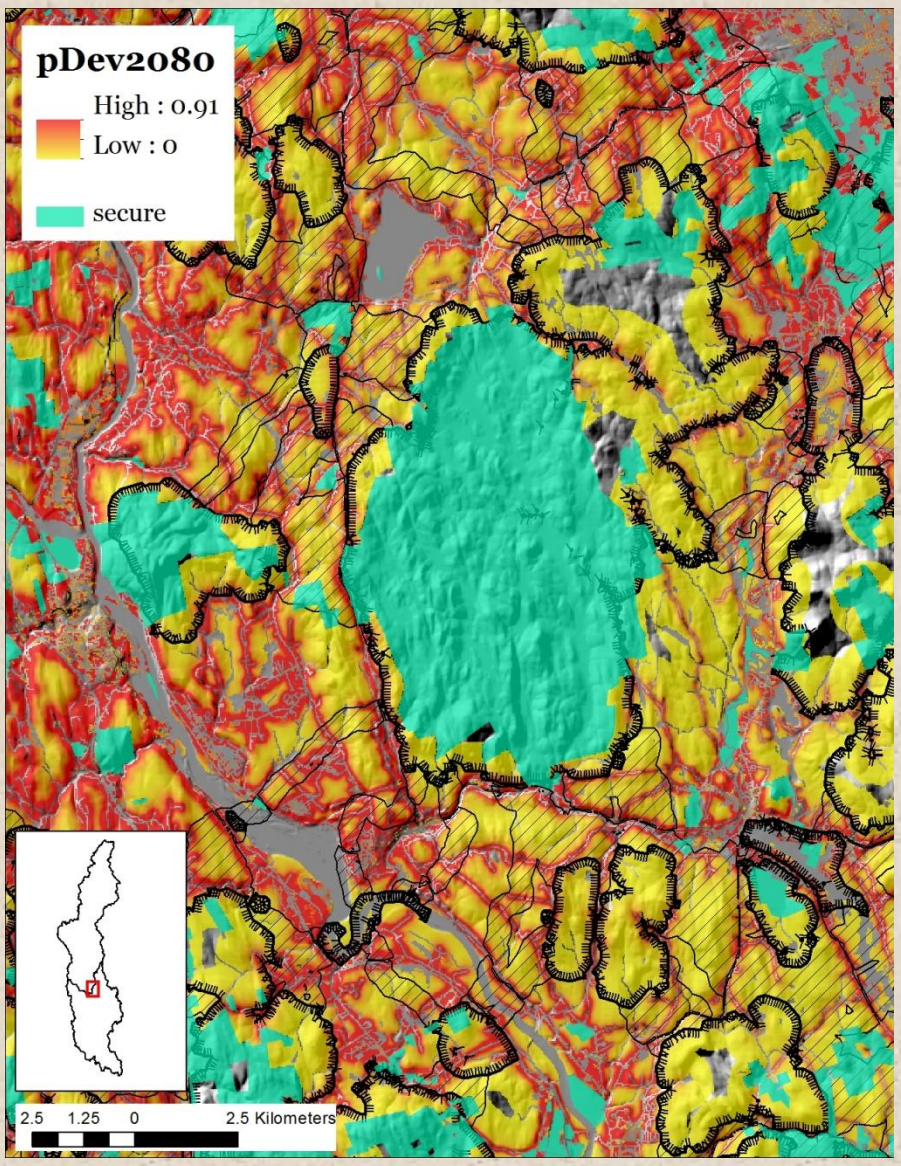


LCD Package: Use and Interpretation

Probability of development (pDev2080)

pDev2080

- Integrated probability of development between 2010-2080
- Independent of designated cores
- Strong road proximity bias
- Best interpreted as relative probability

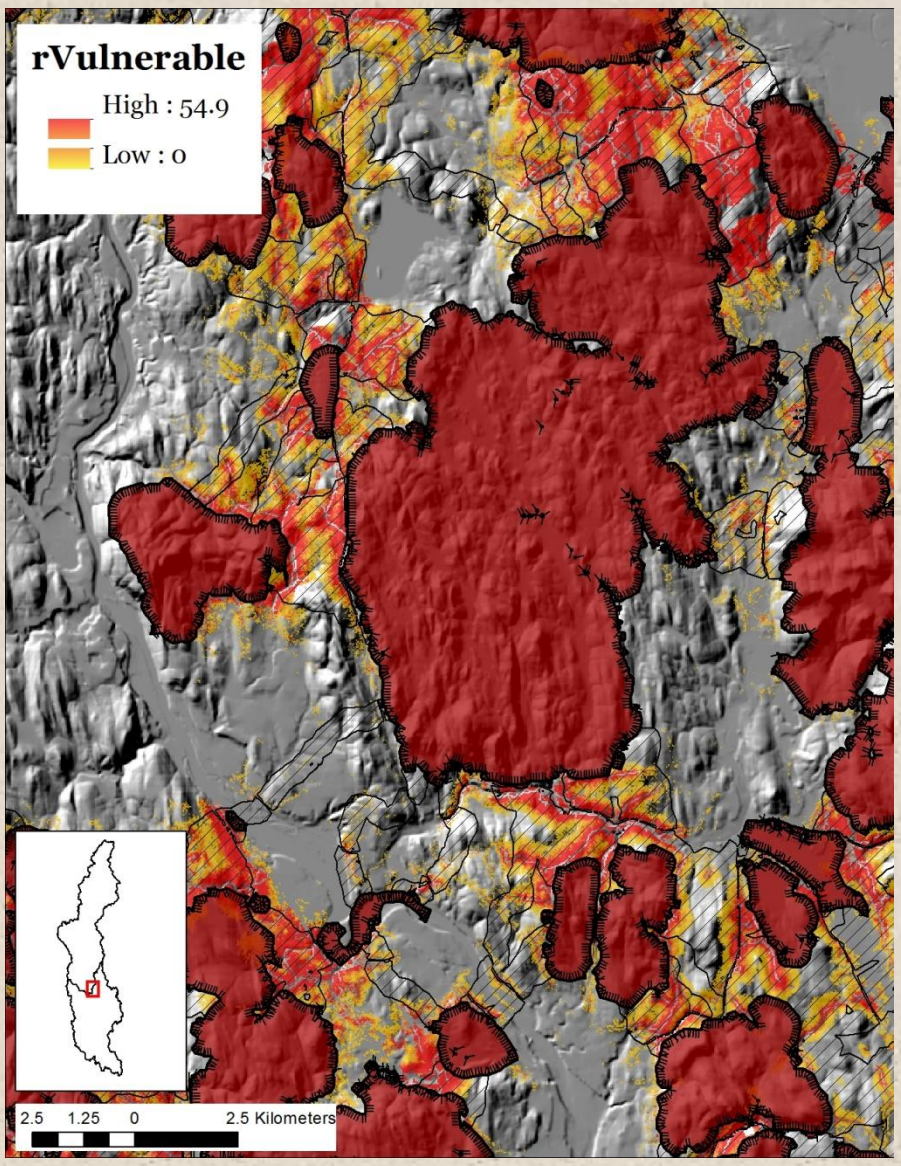


LCD Package: Use and Interpretation

Regional vulnerability (rVulnerable)

rVulnerable

- Relative likelihood of development occurring in places that confer connectivity between cores
- Dependent on designated cores
- Best interpreted as relative vulnerability of connectivity between cores

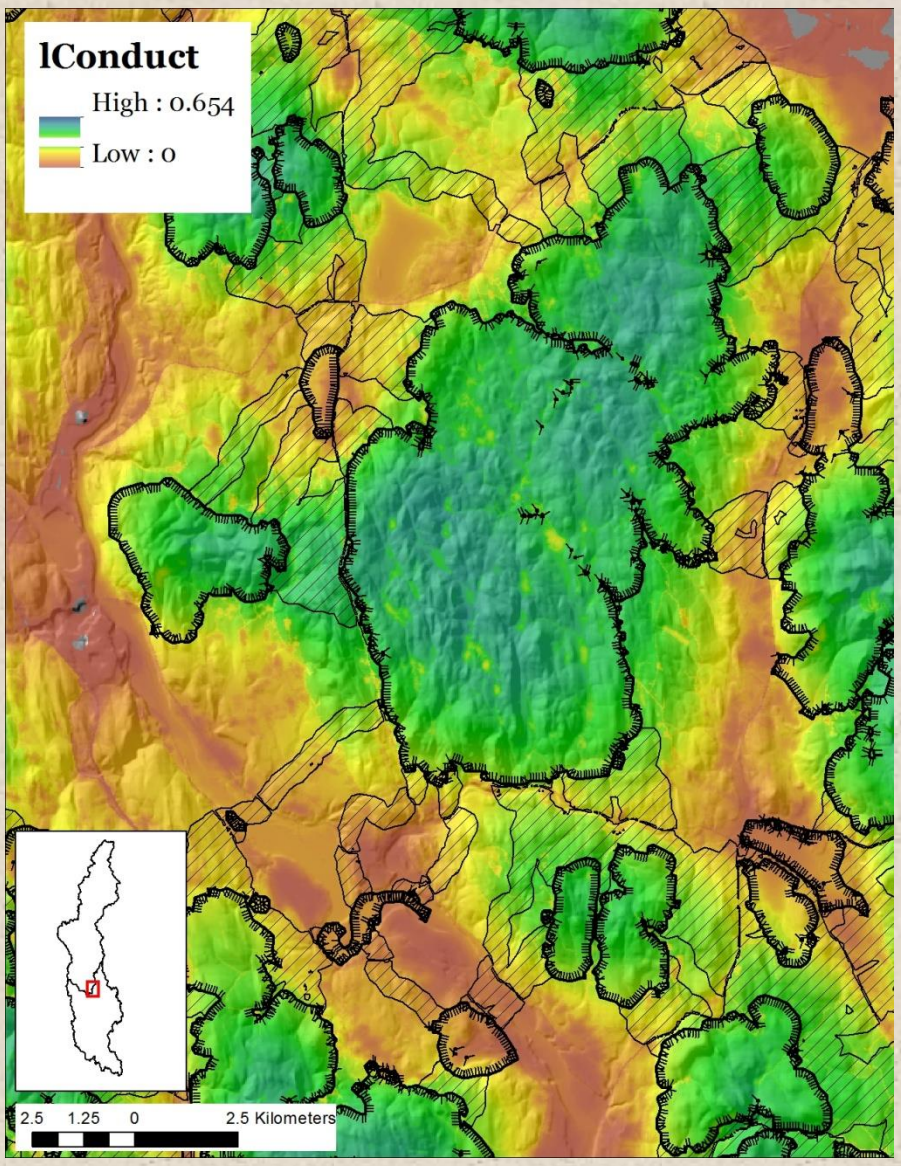


LCD Package: Use and Interpretation

Local conductance (lConduct)

lConduct

- Relative magnitude of ecological flow through a cell at the scale of one to a few 10 km
- Independent of designated cores
- Not focal species based
- Best used to assess connectivity within cores

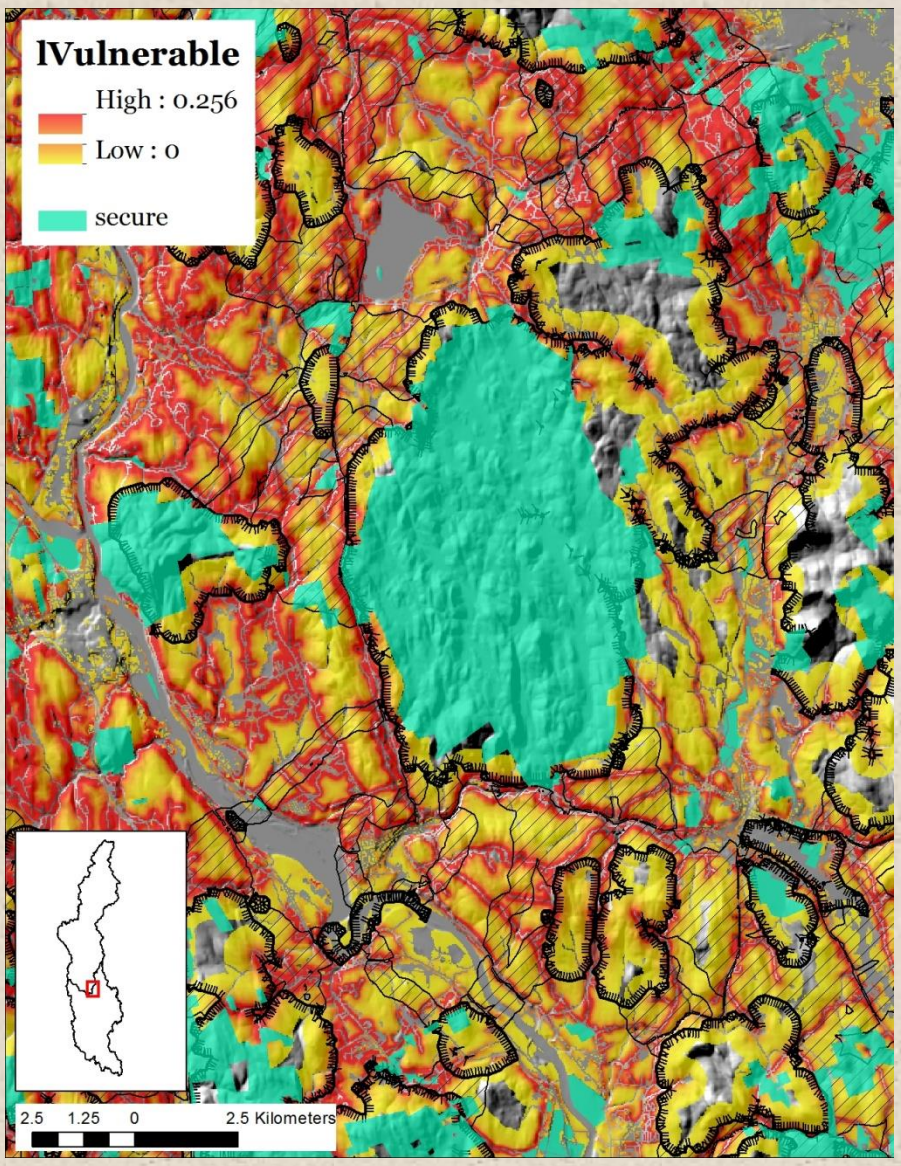


LCD Package: Use and Interpretation

Local vulnerability (lVulnerable)

lVulnerable

- Relative likelihood of development occurring in places that confer local connectivity
- Independent of designated cores
- Best interpreted as relative vulnerability of connectivity within cores

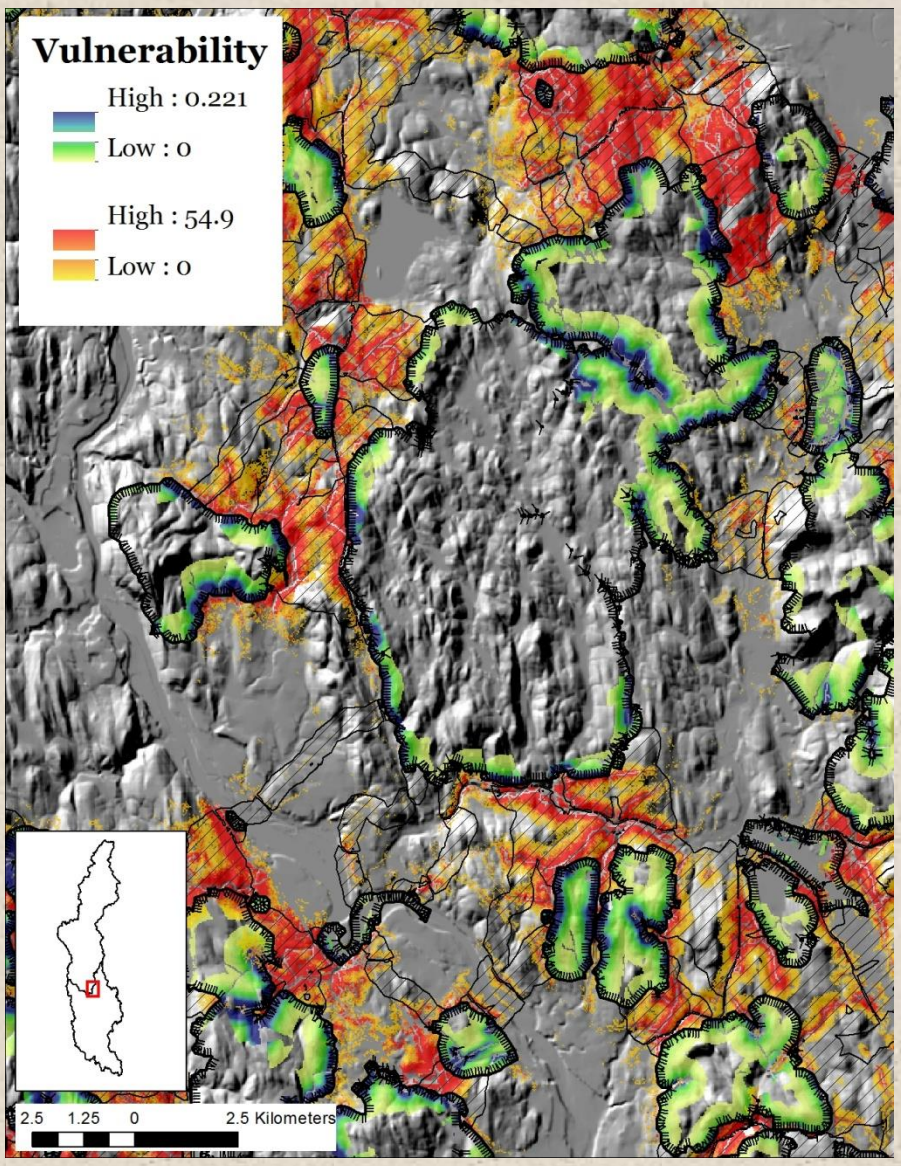


LCD Package: Use and Interpretation

Combined vulnerability

Vulnerability

- Use lVulnerable within cores
- Use rVulnerable between cores

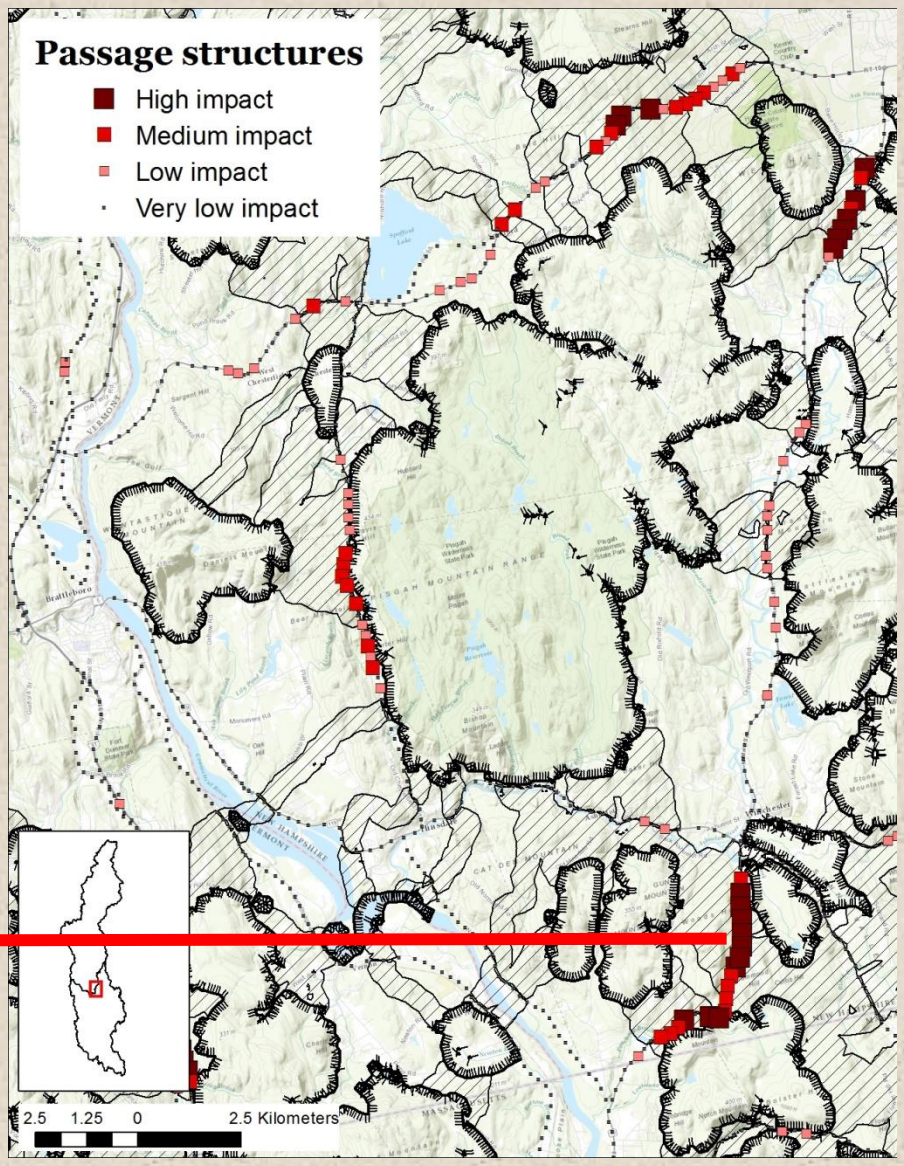


LCD Package: Use and Interpretation

Terrestrial road passage structures (passages)

passages

Field	Value
FID	13638
Shape	Point
PASSAGEID	1574635
X_COORD	1901380.087
Y_COORD	2431550.574
BASE	601.217603
ALT	616.016376
DELTA	14798.77372
IMPACT	9536.395767
IMPACT_LN	9.162976
RANK	42



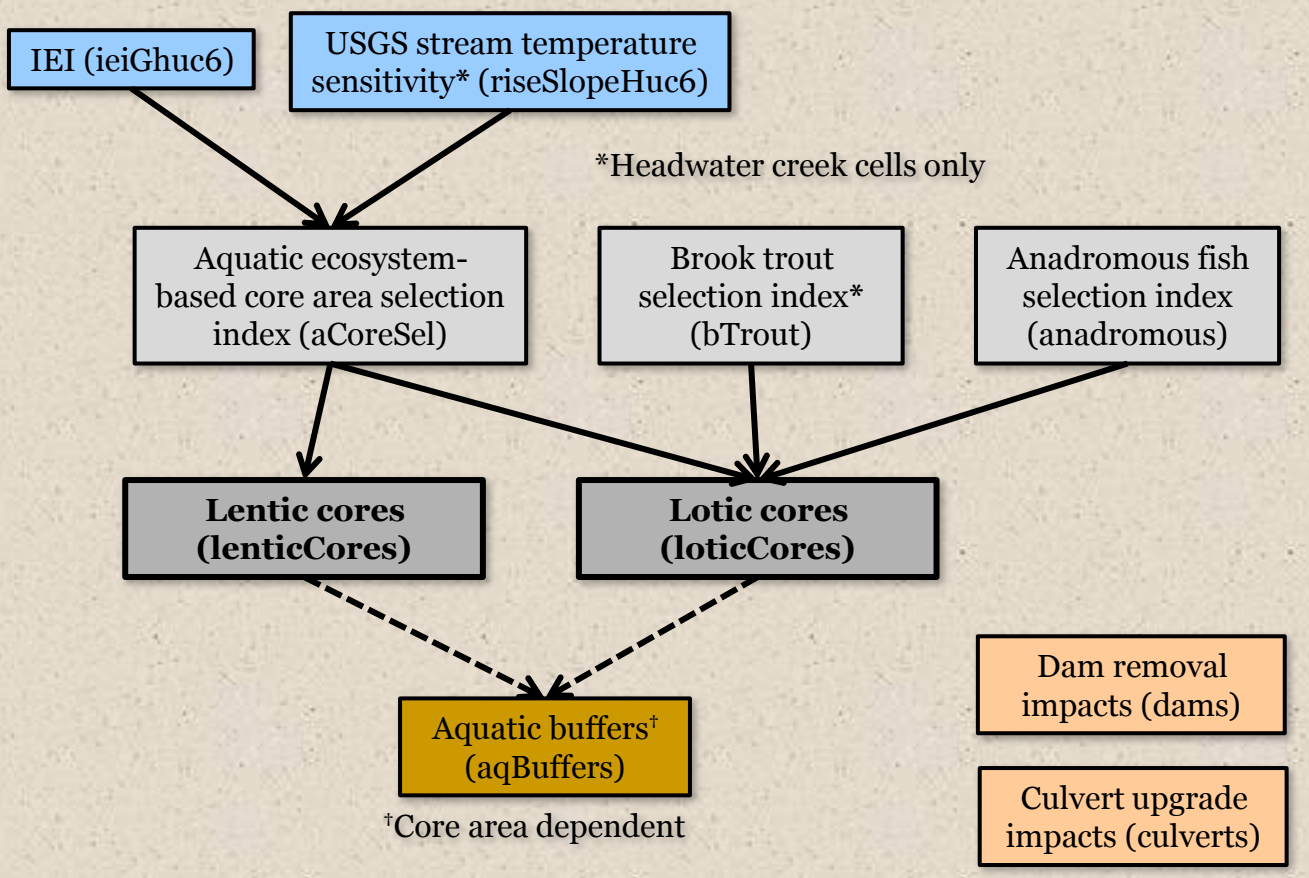
LCD Package

Aquatic data layers

- Lotic (river and stream) cores (**loticCore**s)
- Lentic (lake and pond) cores (**lenticCores**)
- Brook trout selection index (**bTrout**)
- Anadromous fish selection index (**anadromous**)
- Aquatic ecosystem-based core area selection index (**aCoreSel**)
- USGS stream temperature sensitivity (**riseSlopeHuc6**)
- Weighted Index of Ecological Integrity (**ieiGhuc6**)
- Aquatic buffers (**aqBuffers**)
- Dam removal impacts (**dams**)
- Culvert upgrade impacts (**culverts**)

LCD Package

Aquatic data layers

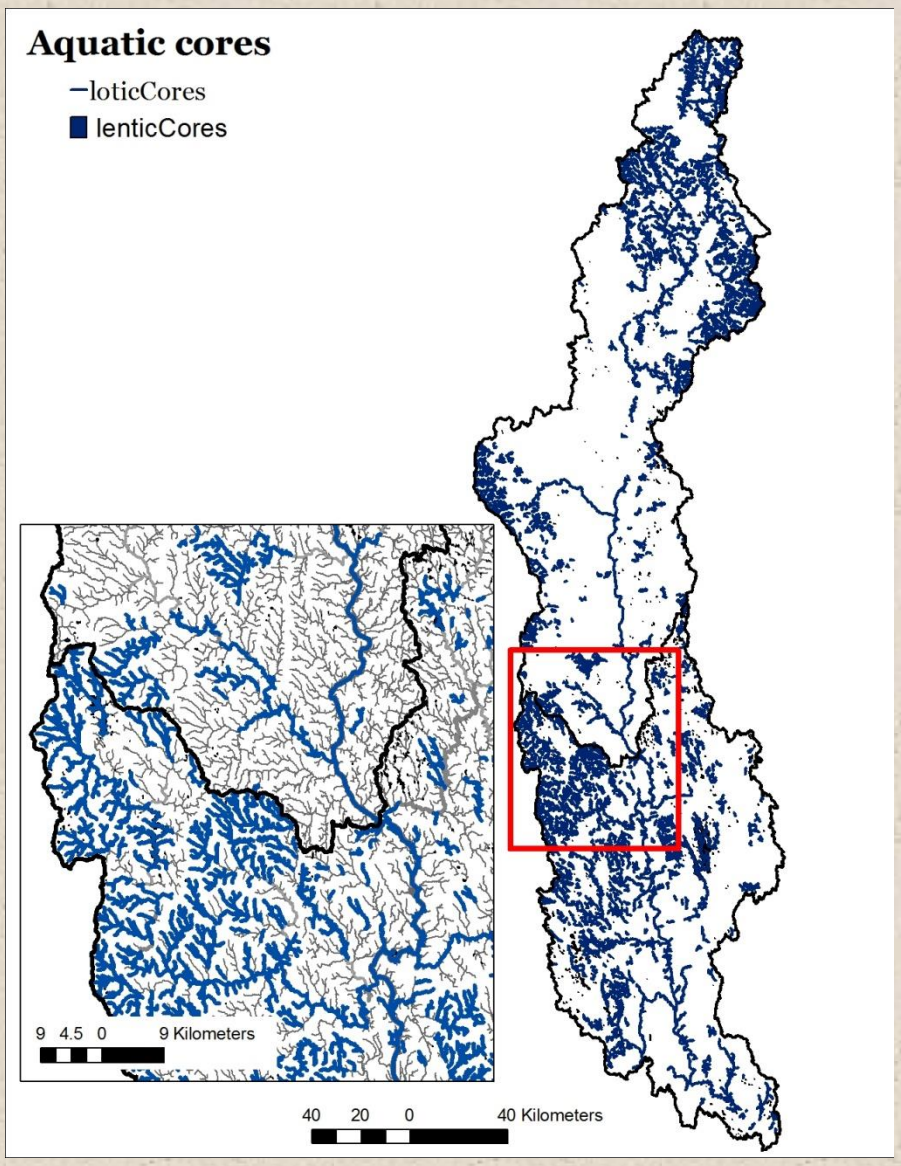


LCD Package: Use and Interpretation

Aquatic cores (loticCores and lenticCores)

Aquatic cores

- Starting point for regional conservation network to be used with other sources of information
- Not the only places of high ecological value within the aquascape
- Boundaries are "fuzzy"

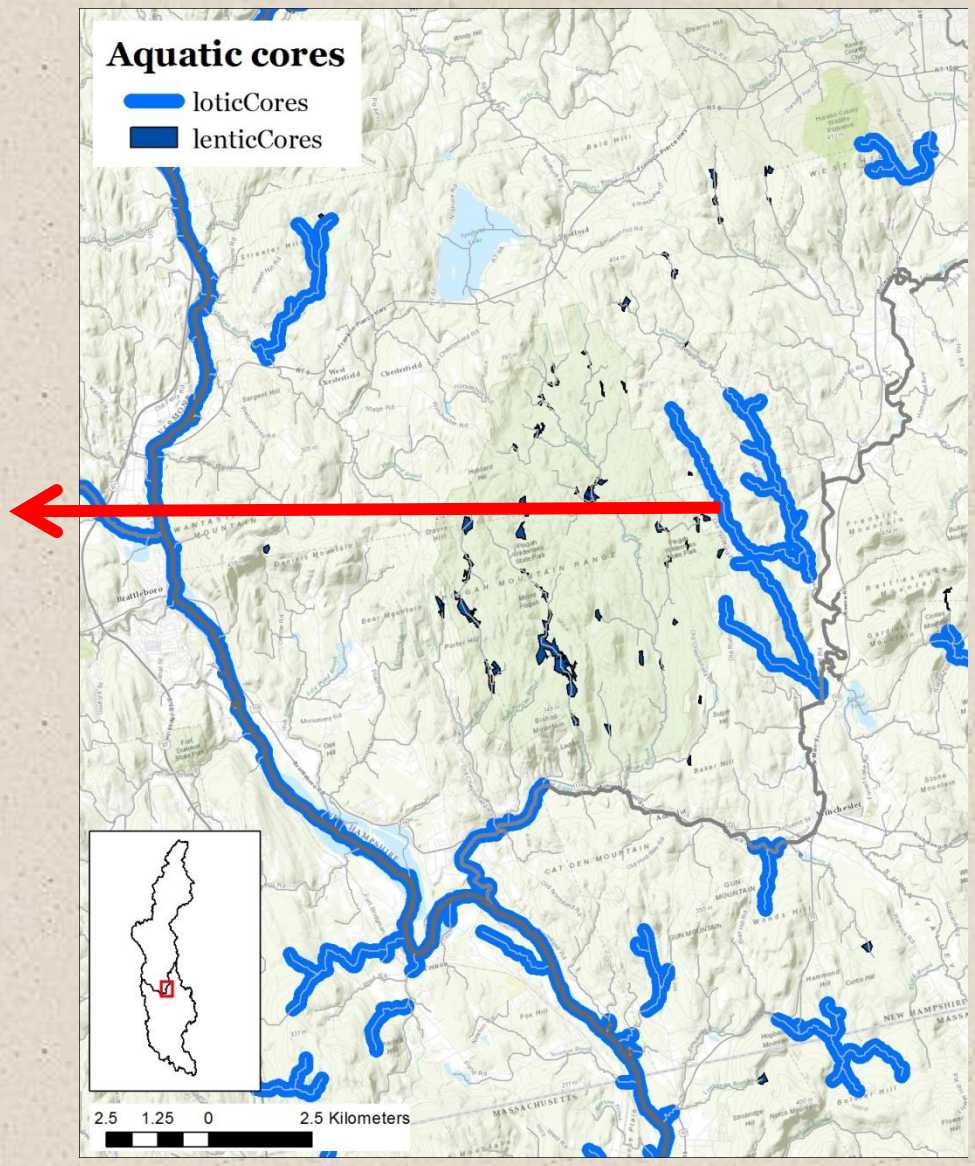


LCD Package: Use and Interpretation

Aquatic cores (loticCores and lenticCores)

loticCores

Field	Value
FID	245
Shape	Polyline
coreID	246
TYPE	core
LENGTHKM	14.28
SYSTEM1	Stream (headwater/creek) cold moderate
SYSTEM2	Stream (headwater/creek) cold low
SYSTEM3	NA
SCENARIO	Z:/LCC/GIS/Final/LCD/combined/Jan2015/fut



LCD Package: Use and Interpretation

Aquatic cores (loticCores and lenticCores)

- Ecosystem composition indices

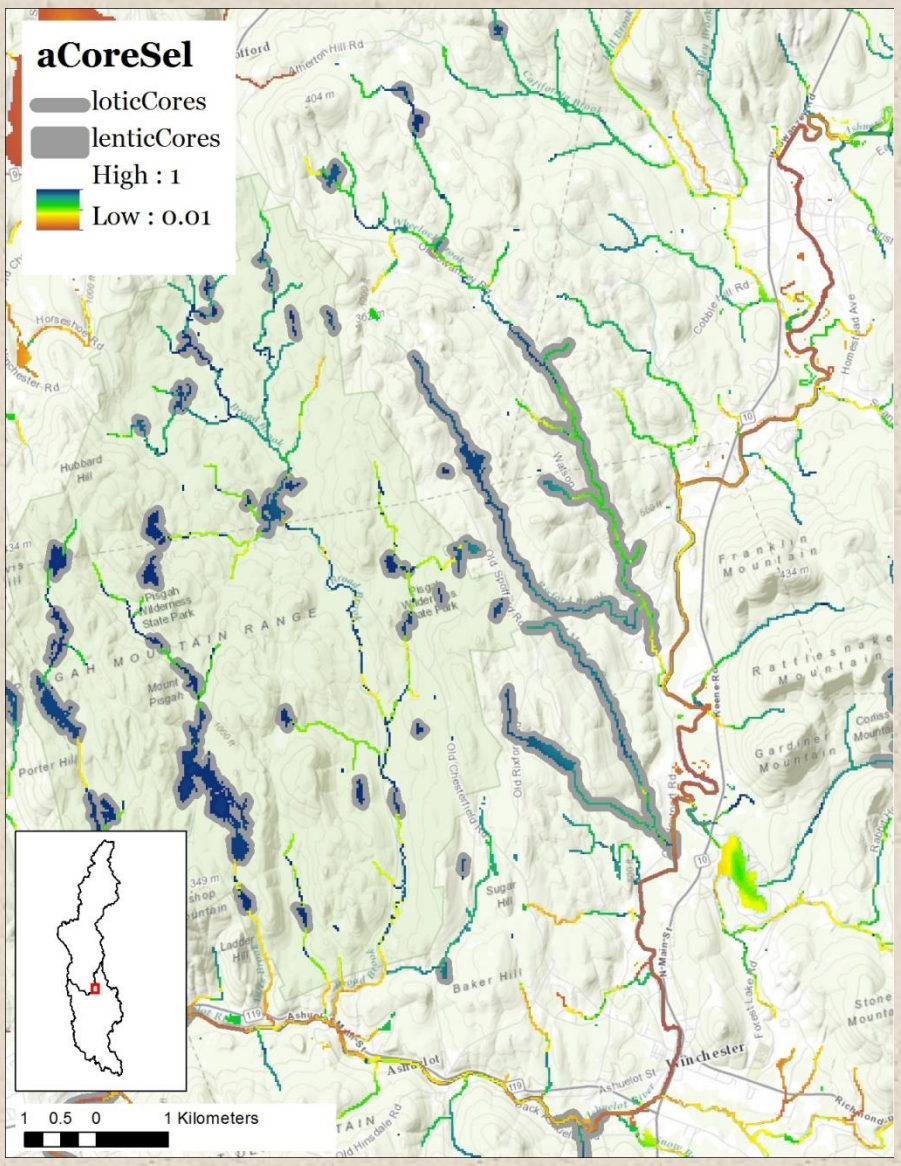
systemName	lengthKm	index1	index1Rank	index2	index2Rank	index3	index3Rank	index4	index4Rank
Stream (headwater/creek) cold moderate	2.58	2.39	63	19.48	85	0.40	59	0.03	129
Stream (headwater/creek) cold low	0.63	1.39	114	3.07	124	0.23	112	-0.02	169
Stream (headwater/creek) cold high	6.30	0.96	302	42.53	280	0.16	141	0.01	174
Stream (headwater/creek) cool low	0.06	0.00	119	0.00	530	0.00	530	-0.16	119
Lake	0.81	NA	NA	NA	NA	NA	NA	NA	NA
Laurentian-Acadian Freshwater Marsh	0.63	NA	NA	NA	NA	NA	NA	NA	NA
Laurentian-Acadian Wet Meadow-Shrub Swamp	1.41	NA	NA	NA	NA	NA	NA	NA	NA
North-Central Appalachian Acidic Swamp	0.90	NA	NA	NA	NA	NA	NA	NA	NA
Pond	0.96	NA	NA	NA	NA	NA	NA	NA	NA

LCD Package: Use and Interpretation

Aquatic eco core selection index (aCoreSel)

aCoreSel

- Integration of IEI and stream temperature sensitivity index (headwater creeks only)
- Scaled by HUC6
- Seamless and continuous valuation of ecological value (inside and outside cores)

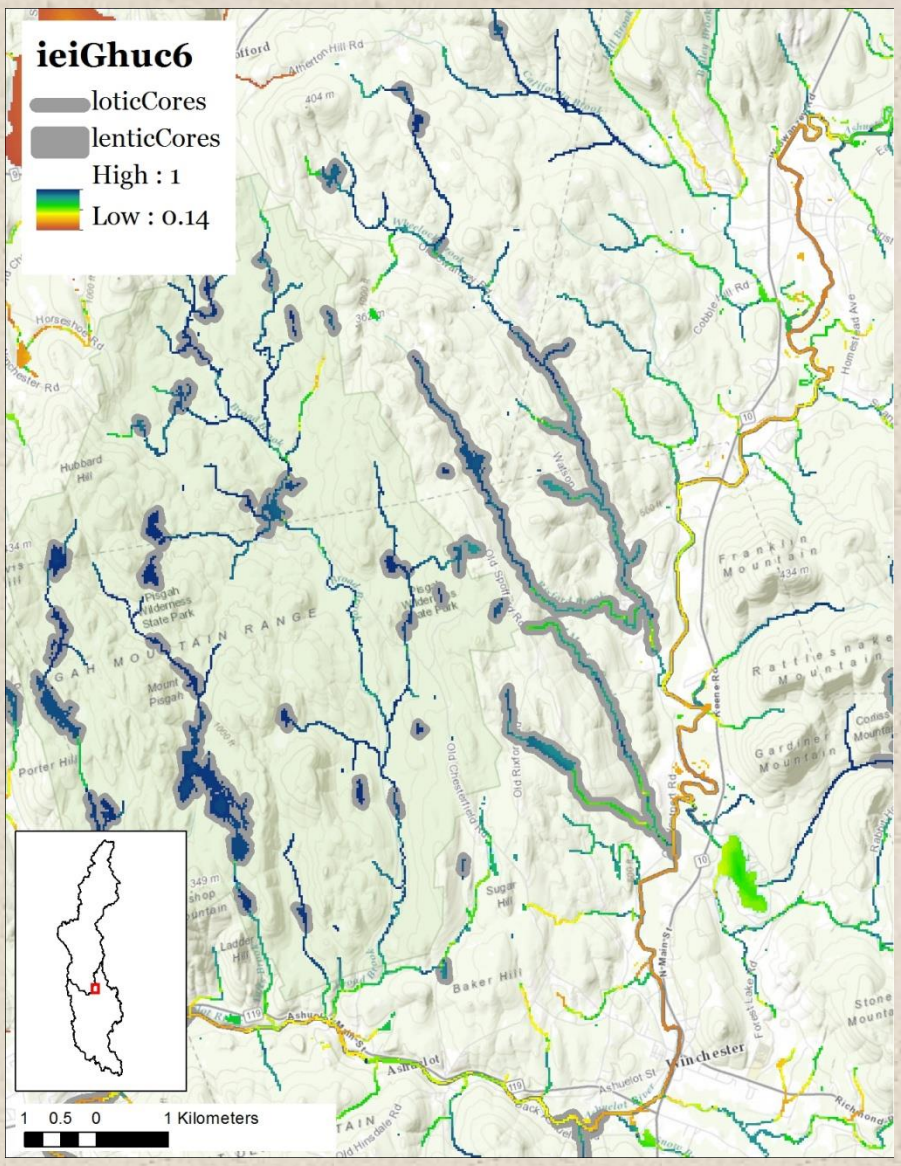


LCD Package: Use and Interpretation

Aquatic IEI (ieiGhuc6)

ieiGhuc6

- Composite of multiple measures of intactness and short-term resiliency
- Unweighted ecological systems
- Scaled by ecological system and HUC6
- Seamless and continuous valuation of ecological value (inside and outside cores)

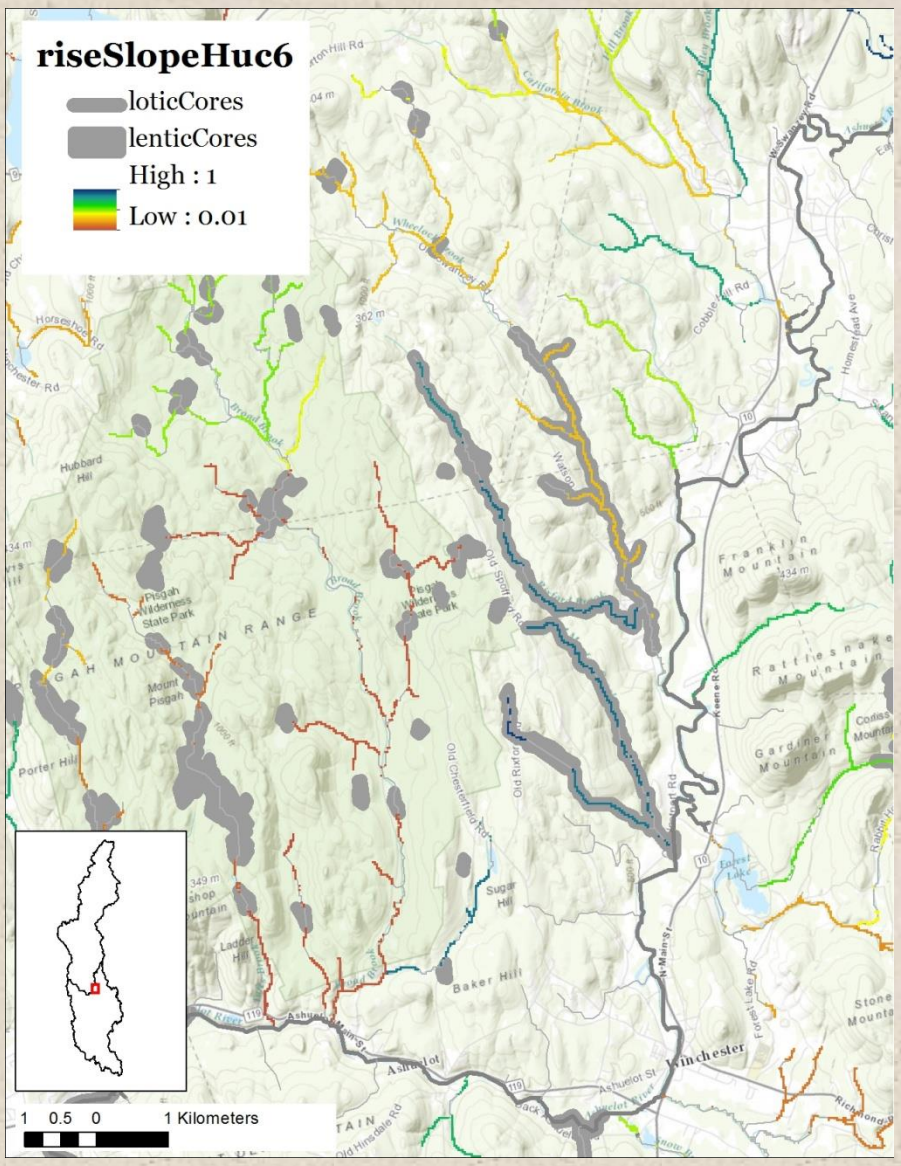


LCD Package: Use and Interpretation

Stream temperature sensitivity (riseSlopeHuc6)

riseSlopeHuc6

- Index of stream temperature sensitivity (for headwater creeks only)
- Scaled by ecological system and HUC6
- Seamless and continuous valuation of ecological value (inside and outside cores)

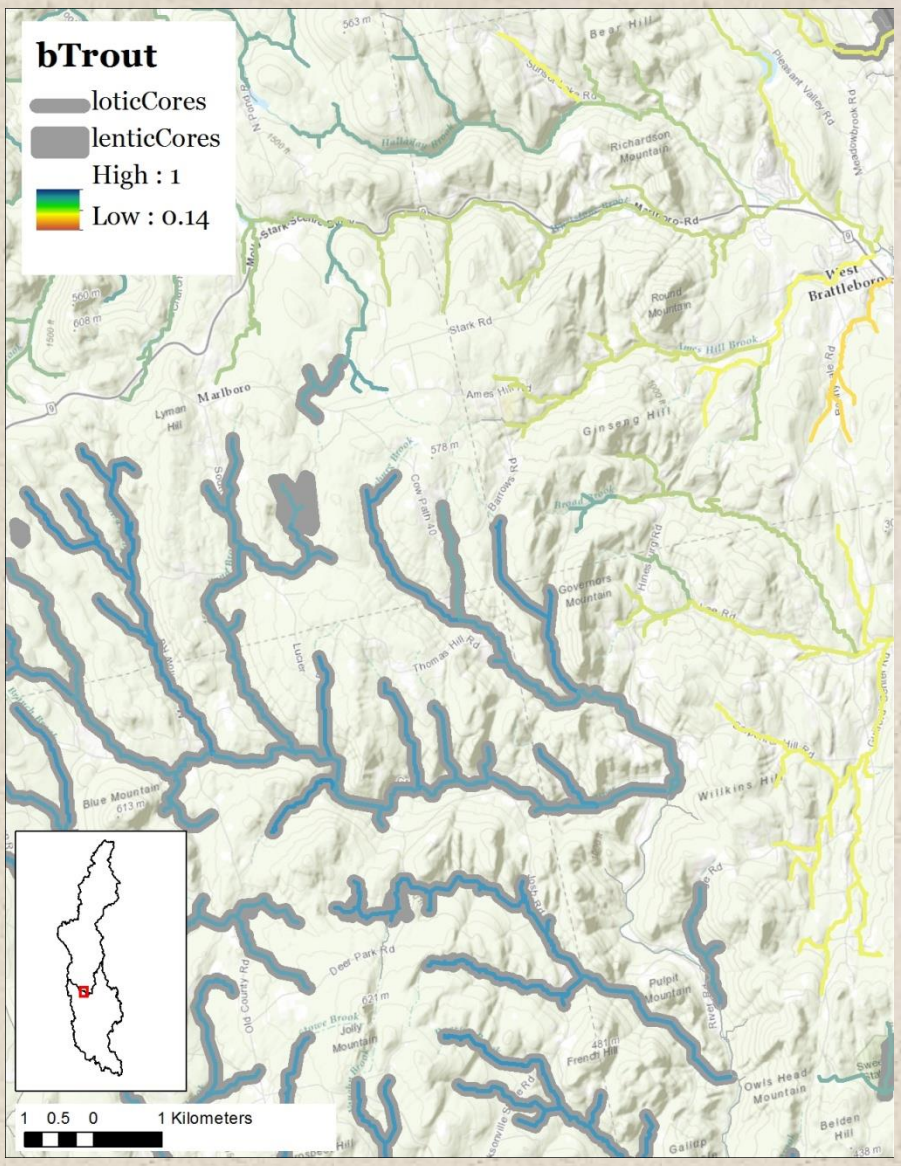


LCD Package: Use and Interpretation

Brook trout prob occupancy (bTrout)

bTrout

- Probability of occurrence (averaged between 2010 and 2080 climate) from USGS Letcher
- Analogous to clPers80
- Headwater creeks only
- Seamless and continuous valuation of ecological value (inside and outside cores)

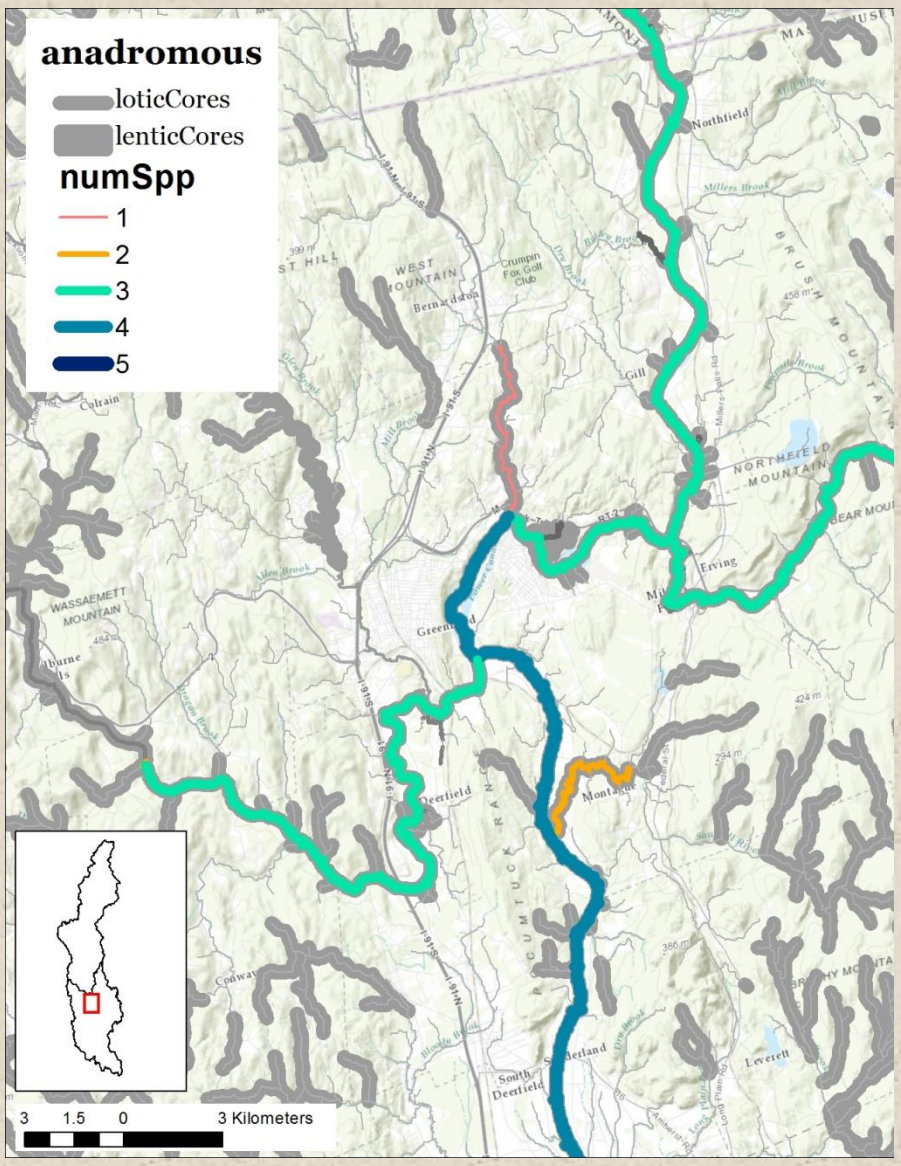


LCD Package: Use and Interpretation

Anadromous fish (anadromous)

anadromous

- Occurrence of 5 species of anadromous fish: American shad, blueback herring, shortnose sturgeon, alewife, and sea lamprey
- Mainstem and major tributaries
- All designated as lotic core

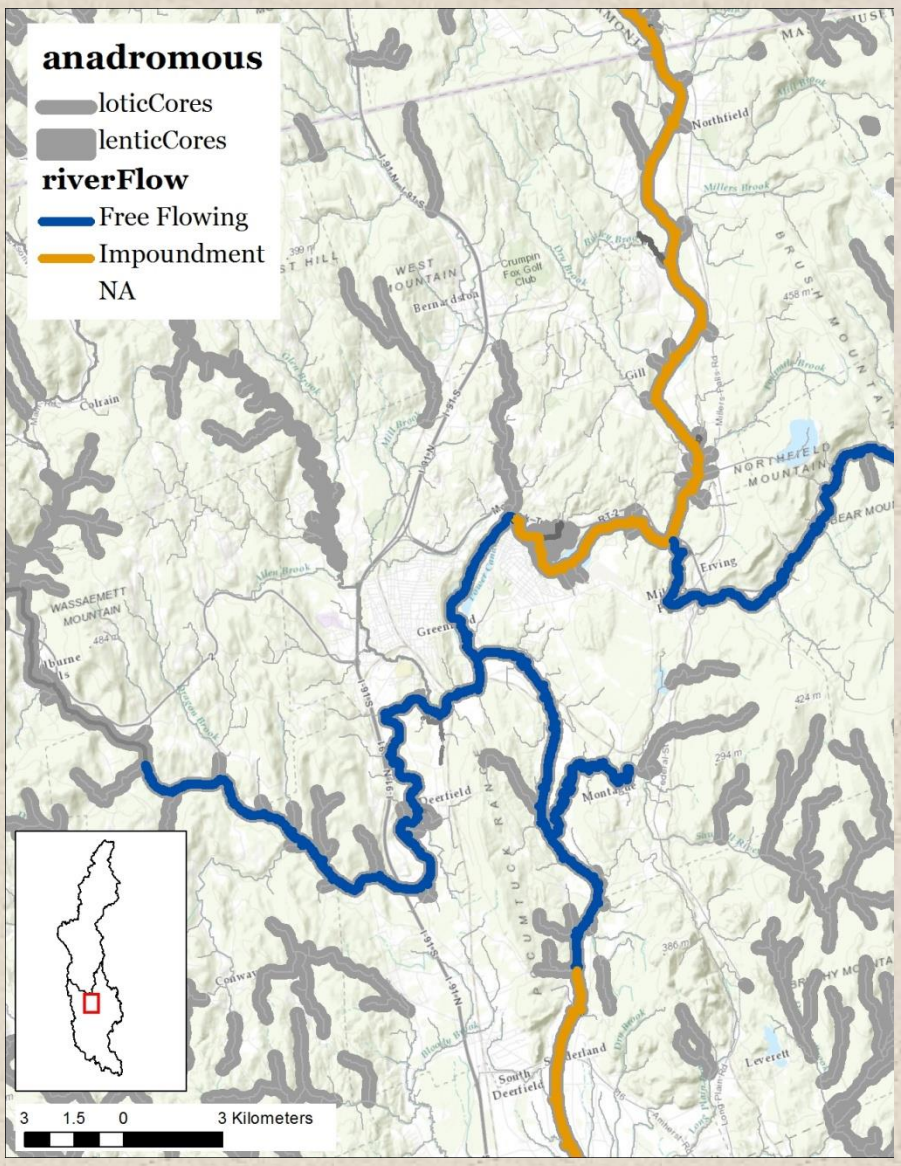


LCD Package: Use and Interpretation

Anadromous fish (anadromous)

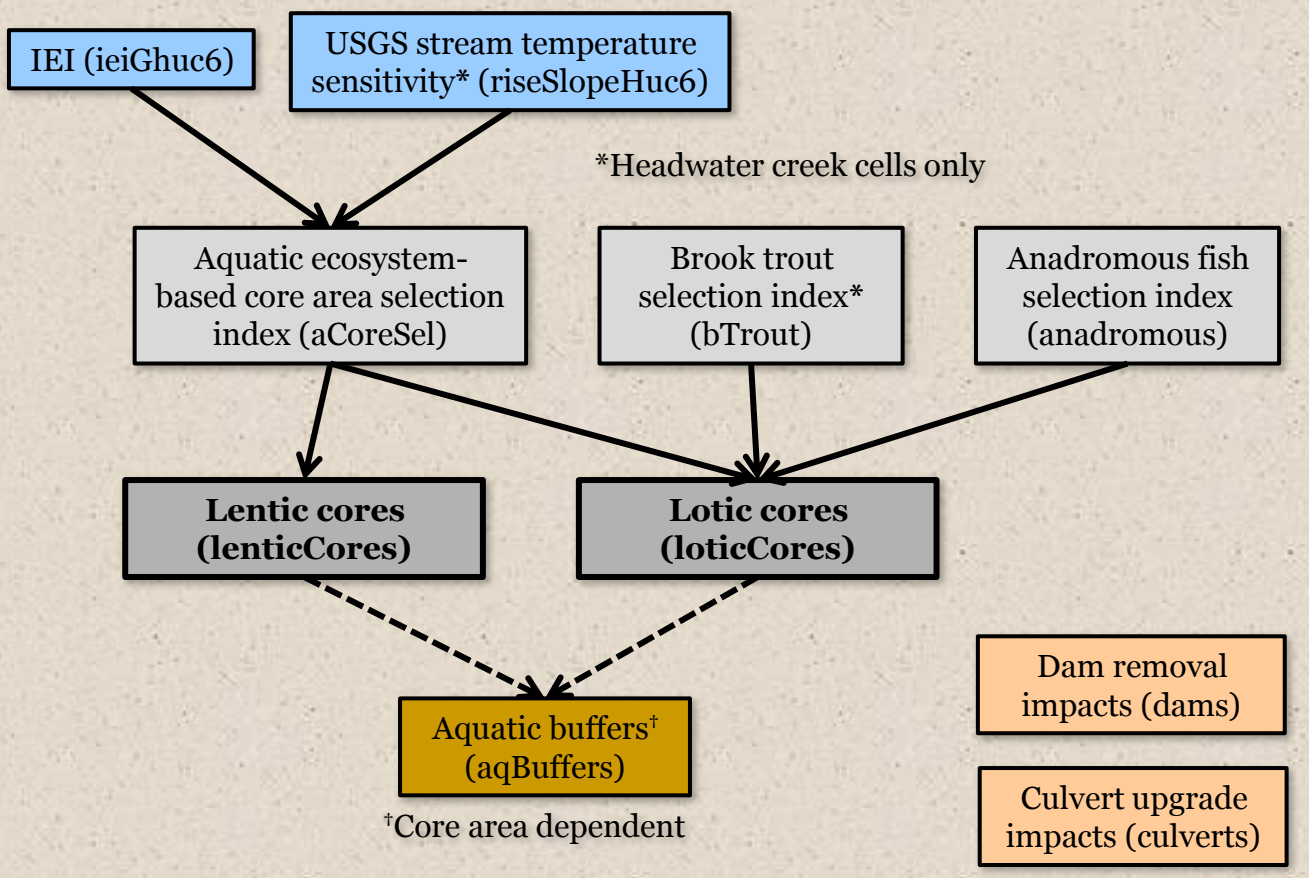
anadromous

- Free flowing vs impounded sections



LCD Package

Aquatic data layers

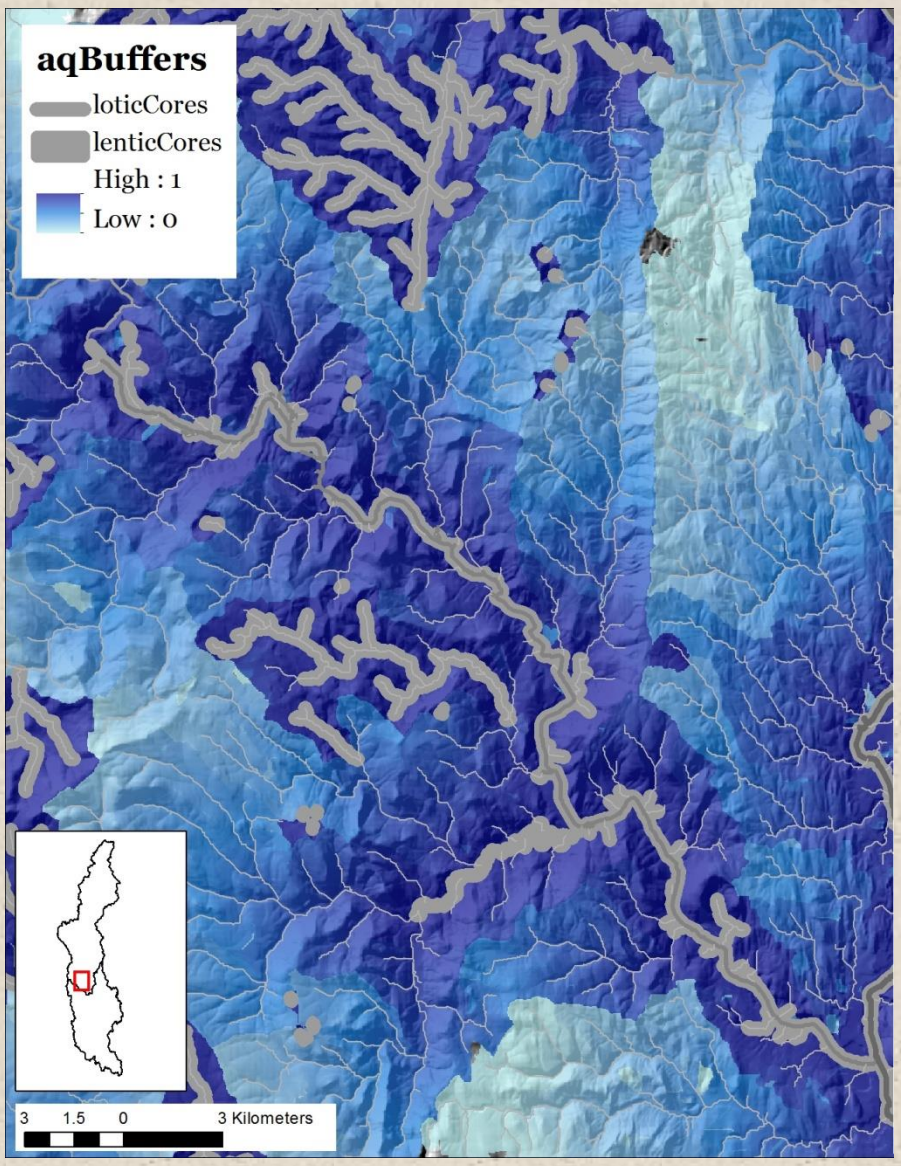


LCD Package: Use and Interpretation

Aquatic buffers (aqBuffers)

aqBuffers

- Graduated zone of influence upstream and upslope of aquatic cores
- Based on a time-of-flow model

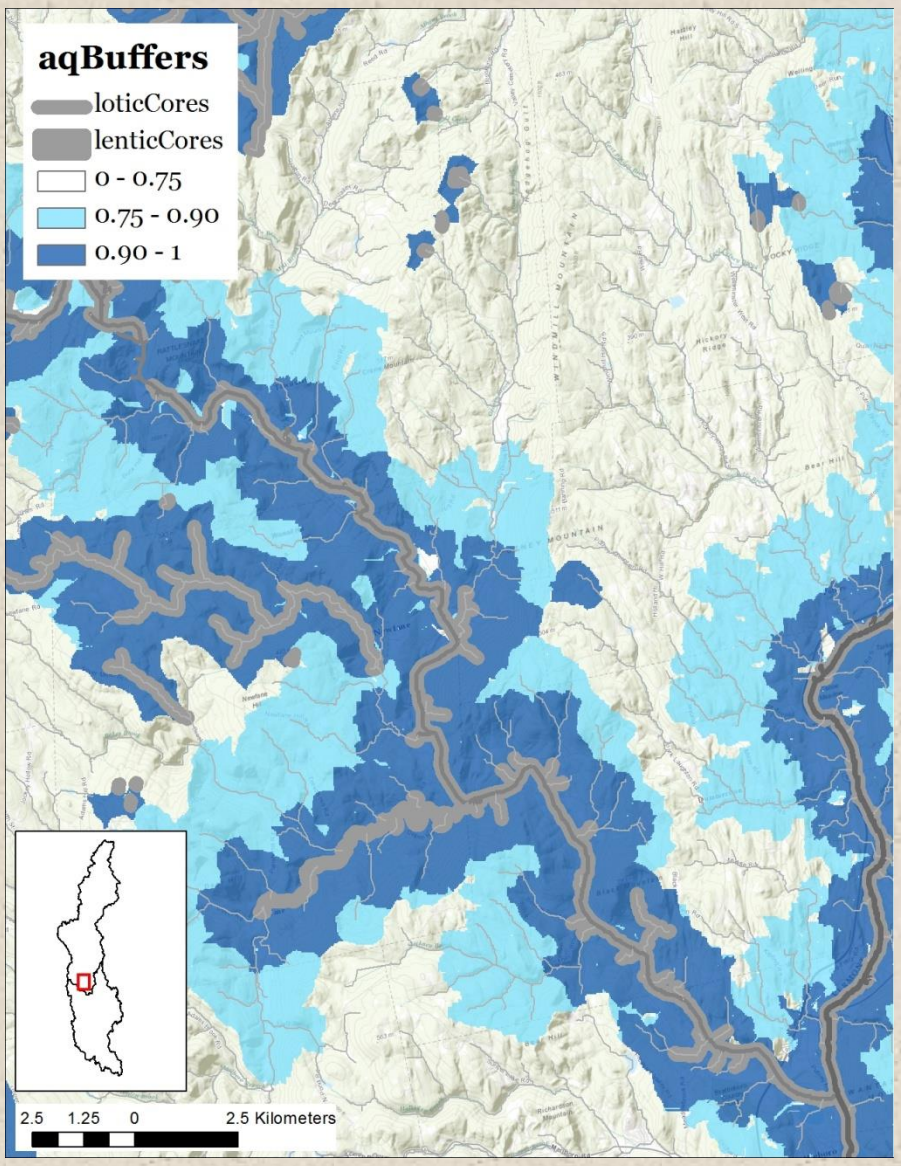


LCD Package: Use and Interpretation

Aquatic buffers (aqBuffers)

aqBuffers

- Tiered zones of influence my facilitate use
- Thresholds for tiers are arbitrary

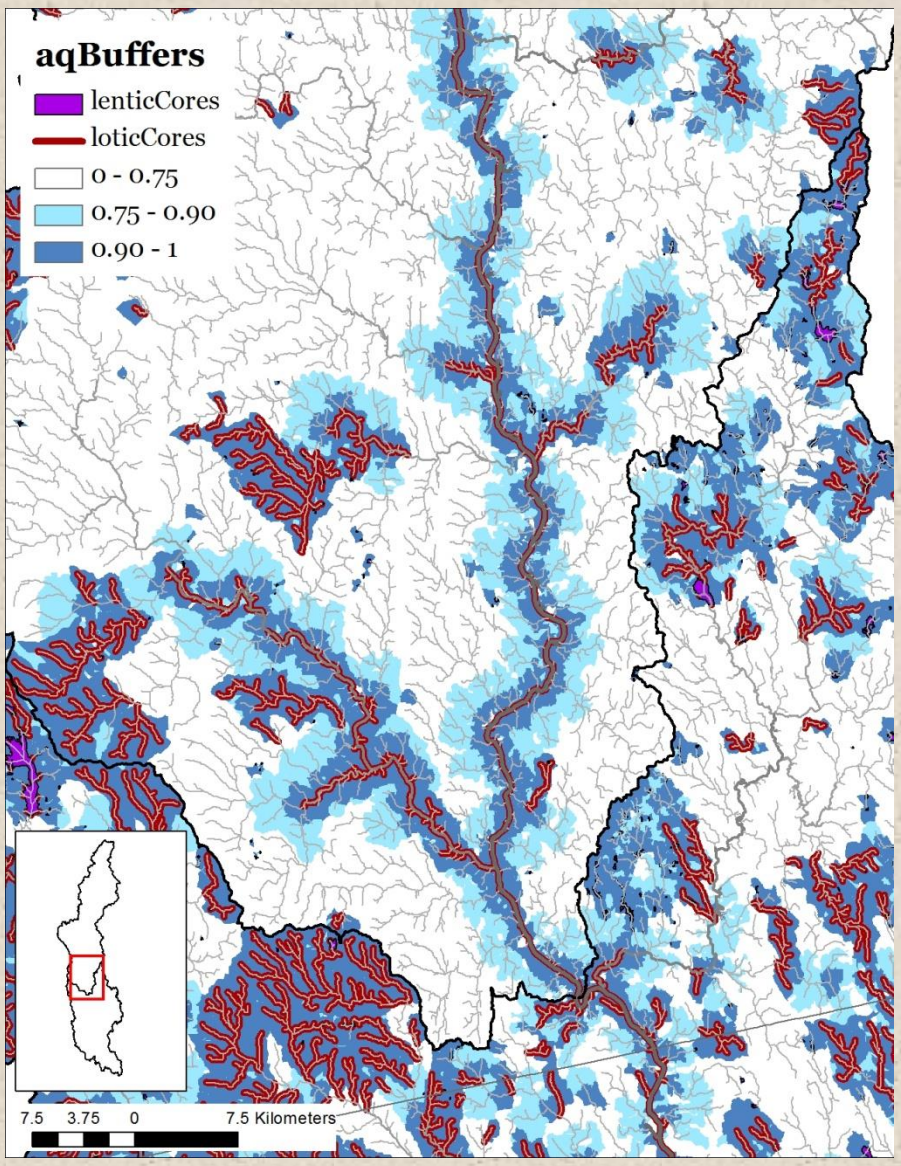


LCD Package: Use and Interpretation

Aquatic buffers (aqBuffers)

aqBuffers

- Tiered zones of influence my facilitate use
- Thresholds for tiers are arbitrary



LCD Package: Use and Interpretation

Dams and culverts (dams/culverts)

dams and culverts

Field	Value
FID	11231
Shape	Point
CROSSINGID	104347
X_COORD	1871554.299
Y_COORD	2467586.518
GROUP	425817
GROUPSIZE	2
ANYSURVEY	0
SURVEYED	0
BASE	2864.213518
ALT	2885.232295
DELTA	21018.77726
IMPACT	13127.40637
IMPACT_LN	9.482534
AQUATIC	0.674
BRIDGE	0
RANK	480

Field	Value
FID	329
Shape	Point
DAMID	10152
X_COORD	1861115.127
Y_COORD	2465524.997
DAM	VT_105.01
DAMHEIGHT	79.25
BASE	1371.601802
ALT	1420.364139
DELTA	48762.33708
IMPACT	20864.05817
IMPACT_LN	9.945831
RANK	144