Implementing CHJV Forest and Woodland Habitat Objectives:
Recommendations for Indiana

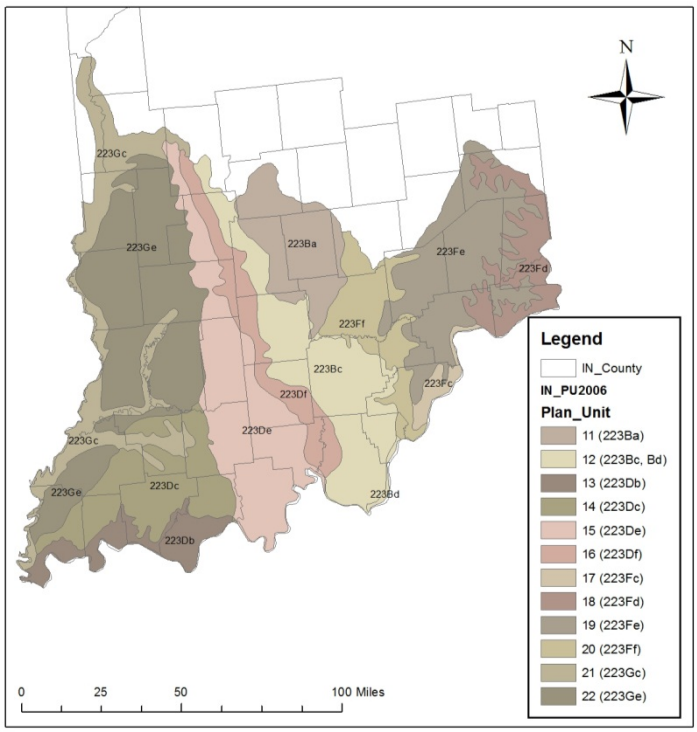
Overview

The Central Hardwoods Joint Venture (CHJV) is a partnership of state and federal government agencies and non-governmental organizations who work together to ensure the long-term viability of native bird populations within the Central Hardwoods Bird Conservation Region (CHBCR). The CHJV pursues this mission by striving towards 2 primary goals: (1) implement conservation actions based on sound science and principals of adaptive management, and (2) target landscapes with the greatest ecological and socioeconomic potential to support viable populations of priority birds. In pursuit of these goals the CHJV Staff and cooperators have developed a suite of decision support tools (DSTs) aimed at assessing habitat conditions, linking bird populations to habitat condition, forecasting potential future habitat conditions, and simulating population impacts of conservation scenarios.

CHJV partners have produced population objectives for priority forest and woodland associated bird species. CHJV staff have used the DSTs to estimate the amount of habitat restoration needed to support those populations and allocated the habitat objectives to State sub-regions and the conservation actors (i.e. agencies) within them. Uncertainty in the allocation process requires an iterative and adaptive approach to translating CHBCR objectives into an implementation plan (i.e. on-the-ground projects). This document builds off the Implementation Framework document by summarizing DST and other information to help partners within the Indiana sub-region develop the strategic (where to work) and tactical (what work to do) components of their implementation plan.

Planning Units

The CHJV uses Bailey's ecological subsections as planning units. Indiana is divided into 12 planning units (map at right). Table 1 ranks each unit relative to others within Indiana on attributes relevant to conservation planning, and each attribute is mapped in Figures 1-10. Table 2 lists the calculated habitat objectives by natural community type, along with information on forested area, proportion of public ownership and an estimate of area in condition for each community.



From a CHBCR perspective, Indiana is relatively important for the forest and riparian bird groups. Planning Units 11, 15, and 16 were identified as a source landscape for Wood Thrush, Worm-eating Warblers, and Prairie Warblers by the CHJV population viability model. These areas have relatively high levels of forest, public ownership, natural land cover types, as well as low levels of fragmentation. However, urbanization is likely to be an increasing threat to these planning units.

Table 1. The 12 planning units (i.e. landscapes) within the Indiana sub-region and their relative rank based on attributes relevant to conservation planning. Units are ranked from "1" (best) to "12" (worst) relative to conservation perspective. A composite rank will not be calculated until partners determine which attributes are most important.

Plan Unit	Subsection	Short Name	ST	Public [a]	Natural-ness [a]	In Condition [a]	Forest Proportion [a]	GPI [a]	Forest Loss ('01-'06) [a]	Urban 2030 [a]	Ensemble Model Scores [a]		
											Woodland	Forest	Riparian
11	223Ba	Brown County Hills	IN	2	1	5	1	1	2	7	10	1	5
12	223Bc & Bd	Mitchell Karst Plains	IN	6	6	3	6	6	6	10	6	8	9
13	223Db	Lower OH Alluvial	IN	10	12	12	12	12	10	2	11	10	10
14	223Dc	Outer W. Coalfields	IN	9	10	8	9	9	12	4	12	12	12
15	223De	Crawford Uplands	IN	1	3	1	3	3	4	5	4	2	4
16	223Df	Crawford Escarpment	IN	4	4	2	2	2	5	12	1	4	6
17	223Fc	W. Bluegrass	IN	11	7	6	7	7	11	6	5	6	3
18	223Fd	Northern Bluegrass	IN	12	2	4	4	4	1	11	3	3	2
19	223Fe	Muscatatuck Flats	IN	3	5	10	5	5	3	9	2	7	7
20	223Ff	Scottsburg Lowland	IN	7	9	9	8	8	9	8	8	9	8
21	223Gc	Wabash Alluvial	IN	8	8	7	10	10	7	1	7	5	1
22	223Ge	SW IN Glaciated Lowlands	IN	5	11	11	11	11	8	3	9	11	11

[a] Attributes are defined as the quantity of protected lands (Public), overall landscape conditions (Naturalness), extant forest community conditions (In Condition), quantity of forested (i.e. restorable) lands (Forest Proportion), forest fragmentation / avian productivity (GPI), forest loss from 2001-2006 (Loss), urbanization threat (Urban 2030), and current capacity-productivity weighted ensemble model scores for suites of birds. Full definitions are available in the companion Framework document.

Table 2. CHJV Habitat Objectives (targets) by planning unit and natural community type for public lands and for the entire units, along with information on forested area, proportion of public ownership and an estimate of area in condition for each community.

Plan Unit	Acreage Estimate Class	Savanna / Barrens	Glade / Savanna Mosaic (< 20% canopy)	Oak Open Woodland (20-50% canopy)	Oak Closed Woodland (50-80% canopy)	Pine / Bluestem Open Woodland (20-50% canopy)	Pine / Oak Closed Woodland (50-80% canopy)	Forest (> 80% canopy)	Floodplain Forests	Total Area
11	Forested/Restorable	-	-	-	-	-	-	386,834	68,558	455,392
	Protected	-	-	-	-	-	-	133,272	34,839	168,111
	Plan Unit Target (10 sp)	-	-	-	-	-	-	28,512	7,733	36,246
	Plan Unit Target (21 sp)	-	-	-	-	-	-	37,202	22,388	59,589
	Public Target (10 sp)	-	-	-	-	-	-	28,512	7,733	36,246
	Public Target (21 sp)	-	-	-	-	-	-	37,202	22,388	59,589
	In Character/Restored	-	-	-	-	-	-	28,521	-	28,521
	Public In Character	-	-	-	-	-	-	10,897	-	10,897
12	Forested/Restorable	17,503	-	38,727	41,787	-	6,620	316,292	65,801	486,730
	Protected	222	-	442	8,946	-	2,247	25,373	5,129	42,360
	Plan Unit Target (10 sp)	3,964	-	4,482	2,609	-	552	43,595	7,967	63,169
	Plan Unit Target (21 sp)	8,851	-	9,988	5,977	-	1,815	56,881	23,064	106,577
	Public Target (10 sp)	222	-	442	2,609	-	552	25,373	5,129	34,327
	Public Target (21 sp)	222	-	442	5,977	-	1,815	25,373	5,129	38,958
	In Character/Restored	400	-	6,792	35,726	-	-	17,386	2	60,307
	Public In Character	3	-	70	7,924	-	-	3,118	-	11,115
13	Forested/Restorable	-	-	56	1,043	-	-	30,782	37,279	69,160
	Protected	-	-	-	1	-	-	434	7,414	7,848
	Plan Unit Target (10 sp)	-	-	6	84	-	-	6,292	11,657	18,039
	Plan Unit Target (21 sp)	-	-	13	191	-	-	8,209	33,746	42,161
	Public Target (10 sp)	-	-	-	1	-	-	434	7,414	7,848
	Public Target (21 sp)	-	-	-	1	-	-	434	7,414	7,848
	In Character/Restored	-	-	-	904	-	-	240	1	1,144
	Public In Character	-	-	-	0	-	-	2	-	3

Plan Unit	Acreage Estimate Class	Savanna / Barrens	Glade / Savanna Mosaic (< 20% canopy)	Oak Open Woodland (20-50% canopy)	Oak Closed Woodland (50-80% canopy)	Pine / Bluestem Open Woodland (20-50% canopy)	Pine / Oak Closed Woodland (50-80% canopy)	Forest (> 80% canopy)	Floodplain Forests	Total Area
14	Forested/Restorable	45	-	-	8,332	-	-	151,844	62,211	222,431
	Protected	-	-	-	98	-	-	6,520	3,858	10,476
	Plan Unit Target (10 sp)	15	-	-	1,193	-	-	29,293	12,597	43,098
	Plan Unit Target (21 sp)	33	-	-	2,733	-	-	38,220	36,469	77,455
	Public Target (10 sp)	-	-	-	98	-	-	6,520	3,858	10,476
	Public Target (21 sp)	-	-	-	98	-	-	6,520	3,858	10,476
	In Character/Restored	2	-	-	7,611	-	-	1,746	6	9,364
	Public In Character	-	-	-	83	-	-	44	-	127
15	Forested/Restorable	213	-	26	244,290	-	-	395,288	104,487	744,304
	Protected	-	-	-	79,126	-	-	108,992	36,271	224,390
	Plan Unit Target (10 sp)	23	-	2	14,966	-	-	33,141	12,031	60,163
	Plan Unit Target (21 sp)	51	-	4	34,293	-	-	43,241	34,830	112,419
	Public Target (10 sp)	-	-	-	14,966	-	-	33,141	12,031	60,138
	Public Target (21 sp)	-	-	-	34,293	-	-	43,241	34,830	112,364
	In Character/Restored	16	-	-	203,781	-	-	34,505	1	238,303
	Public In Character	-	-	-	57,060	-	-	9,598	-	66,658
16	Forested/Restorable	215	-	1,134	73,814	-	-	191,446	31,306	297,915
	Protected	-	-	11	12,609	-	-	27,573	8,108	48,301
	Plan Unit Target (10 sp)	117	-	213	4,210	-	-	17,230	2,984	24,755
	Plan Unit Target (21 sp)	262	-	474	9,648	-	-	22,481	8,639	41,504
	Public Target (10 sp)	-	-	11	4,210	-	-	17,230	2,984	24,436
	Public Target (21 sp)	-	-	11	9,648	-	-	22,481	8,108	40,248
	In Character/Restored	-	-	200	65,667	-	-	9,591	-	75,458
	Public In Character	-	-	0	10,000	-	-	1,985	-	11,985

Plan Unit	Acreage Estimate Class	Savanna / Barrens	Glade / Savanna Mosaic (< 20% canopy)	Oak Open Woodland (20-50% canopy)	Oak Closed Woodland (50-80% canopy)	Pine / Bluestem Open Woodland (20-50% canopy)	Pine / Oak Closed Woodland (50-80% canopy)	Forest (> 80% canopy)	Floodplain Forests	Total Area
17	Forested/Restorable	-	-	-	-	-	-	31,941	6,638	38,579
	Protected	-	-	-	-	-	-	2,685	506	3,192
	Plan Unit Target (10 sp)	-	-	-	-	-	-	4,895	642	5,537
	Plan Unit Target (21 sp)	-	-	-	-	-	-	6,387	1,858	8,245
	Public Target (10 sp)	-	-	-	-	-	-	2,685	506	3,192
	Public Target (21 sp)	-	-	-	-	-	-	2,685	506	3,192
	In Character/Restored	-	-	-	-	-	-	1,636	-	1,636
	Public In Character	-	-	-	-	-	-	112	-	112
18	Forested/Restorable	-	-	-	-	-	-	233,834	29,137	262,971
	Protected	-	-	-	-	-	-	859	865	1,724
	Plan Unit Target (10 sp)	-	-	-	-	-	-	20,479	3,793	24,272
	Plan Unit Target (21 sp)	-	-	-	-	-	-	26,721	10,980	37,701
	Public Target (10 sp)	-	-	-	-	-	-	859	865	1,724
	Public Target (21 sp)	-	-	-	-	-	-	859	865	1,724
	In Character/Restored	-	-	-	-	-	-	21,035	-	21,035
	Public In Character	-	-	-	-	-	-	38	-	38
19	Forested/Restorable	-	-	-	-	-	-	406,495	69,419	475,915
	Protected	-	-	-	-	-	-	59,649	11,786	71,435
	Plan Unit Target (10 sp)	-	-	-	-	-	-	56,381	5,874	62,255
	Plan Unit Target (21 sp)	-	-	-	-	-	-	73,563	17,005	90,568
	Public Target (10 sp)	-	-	-	-	-	-	56,381	5,874	62,255
	Public Target (21 sp)	-	-	-	-	-	-	59,649	11,786	71,435
	In Character/Restored	-	-	-	-	-	-	7,499	-	7,499
	Public In Character	-	-	-	-	-	-	360	-	360

Plan Unit	Acreage Estimate Class	Savanna / Barrens	Glade / Savanna Mosaic (< 20% canopy)	Oak Open Woodland (20-50% canopy)	Oak Closed Woodland (50-80% canopy)	Pine / Bluestem Open Woodland (20-50% canopy)	Pine / Oak Closed Woodland (50-80% canopy)	Forest (> 80% canopy)	Floodplain Forests	Total Area
20	Forested/Restorable	-	-	-	4,141	-	559	88,518	61,251	154,468
	Protected	-	-	-	1,469	-	202	14,978	5,324	21,973
	Plan Unit Target (10 sp)	-	-	-	214	-	46	16,262	11,003	27,525
	Plan Unit Target (21 sp)	-	-	-	491	-	153	21,218	31,852	53,713
	Public Target (10 sp)	-	-	-	214	-	46	14,978	5,324	20,563
	Public Target (21 sp)	-	-	-	491	-	153	14,978	5,324	20,946
	In Character/Restored	-	-	-	3,693	-	-	1,869	-	5,562
	Public In Character	-	-	-	1,211	-	-	776	-	1,987
21	Forested/Restorable	6,459	-	2,545	4,977	-	-	106,110	110,597	230,688
	Protected	447	-	154	2,949	-	-	4,410	10,821	18,780
	Plan Unit Target (10 sp)	1,234	-	232	1,333	-	-	14,586	27,378	44,763
	Plan Unit Target (21 sp)	2,756	-	518	3,055	-	-	19,031	79,257	104,616
	Public Target (10 sp)	447	-	154	1,333	-	-	4,410	10,821	17,165
	Public Target (21 sp)	447	-	154	2,949	-	-	4,410	10,821	18,780
	In Character/Restored	261	-	-	4,784	-	-	6,846	1	11,892
	Public In Character	14	-	-	828	-	-	129	-	971
22	Forested/Restorable	16,919	-	-	4,526	-	-	243,396	106,317	371,158
	Protected	1,766	-	-	15	-	-	25,978	19,132	46,891
	Plan Unit Target (10 sp)	5,890	-	-	410	-	-	60,180	25,811	92,291
	Plan Unit Target (21 sp)	13,152	-	-	940	-	-	78,520	74,720	167,333
	Public Target (10 sp)	1,766	-	-	15	-	-	25,978	19,132	46,891
	Public Target (21 sp)	1,766	-	-	15	-	-	25,978	19,132	46,891
	In Character/Restored	518	-	-	4,158	-	-	5,070	-	9,746
	Public In Character	22	-	-	10	-	-	117	-	148

Plan Unit	Acreage Estimate Class	Savanna / Barrens	Glade / Savanna Mosaic (< 20% canopy)	Oak Open Woodland (20-50% canopy)	Oak Closed Woodland (50-80% canopy)	Pine / Bluestem Open Woodland (20-50% canopy)	Pine / Oak Closed Woodland (50-80% canopy)	Forest (> 80% canopy)	Floodplain Forests	Total Area
Total	Forested/Restorable	41,355	-	42,488	382,909	-	7,179	2,582,781	752,999	3,809,711
	Protected	2,434	-	607	105,213	-	2,449	410,725	144,052	665,481
	Plan Unit Target (10 sp)	11,243	-	4,935	25,019	-	599	330,846	129,470	502,112
	Plan Unit Target (21 sp)	25,105	-	10,998	57,329	-	1,968	431,673	374,808	901,880
	Public Target (10 sp)	2,434	-	607	23,446	-	599	216,503	81,671	325,260
	Public Target (21 sp)	2,434	-	607	53,472	-	1,968	243,811	130,160	432,452
	In Character/Restored	1,197	-	6,992	326,324	-	-	135,943	11	470,468
	Public In Character	38	-	70	77,117	-	-	27,176	-	104,402

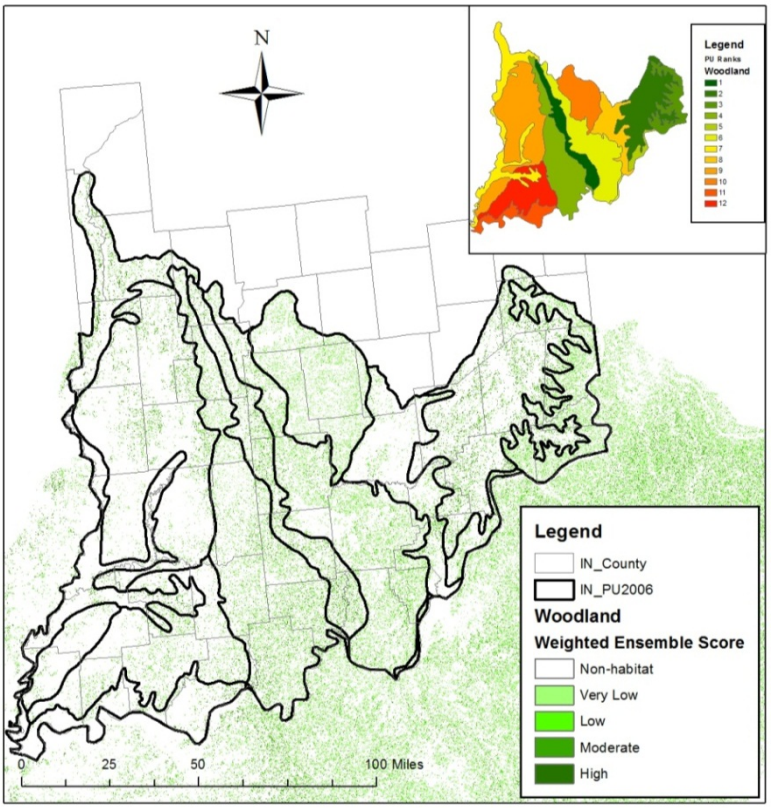


Figure 1. (Q2) Raw scores from the combination of Woodland species habitat models (n=7) weighted by the priority class of each species. Mean scores for each planning unit were used to produce ranks (inset) from high (1) to low (12).

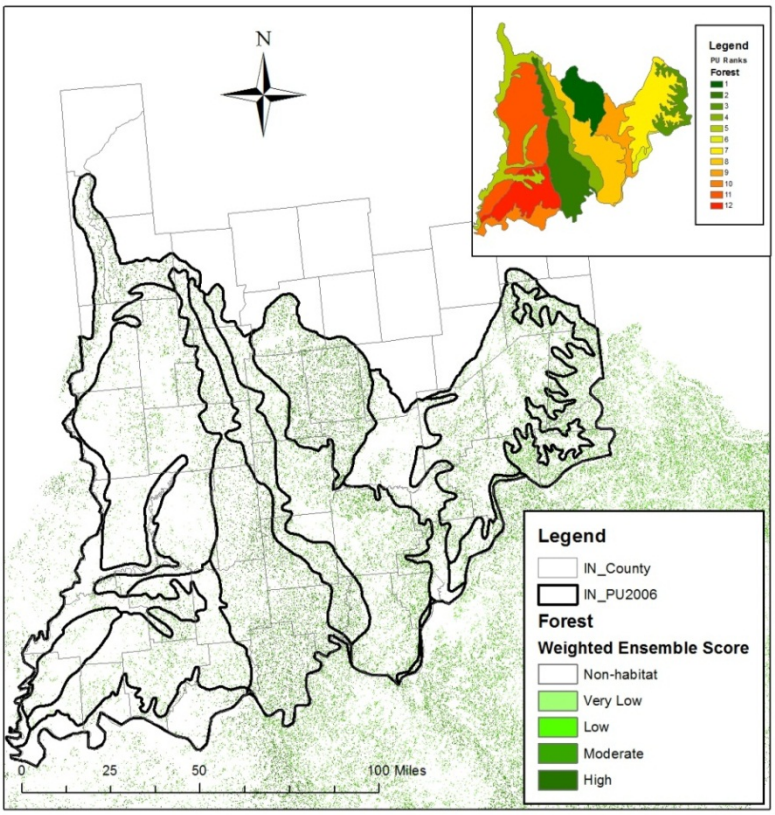


Figure 2. (Q2) Raw scores from the combination of Forest species habitat models (n=7) weighted by the priority class of each species. Mean scores for each planning unit were used to produce ranks (inset) from high (1) to low (12).

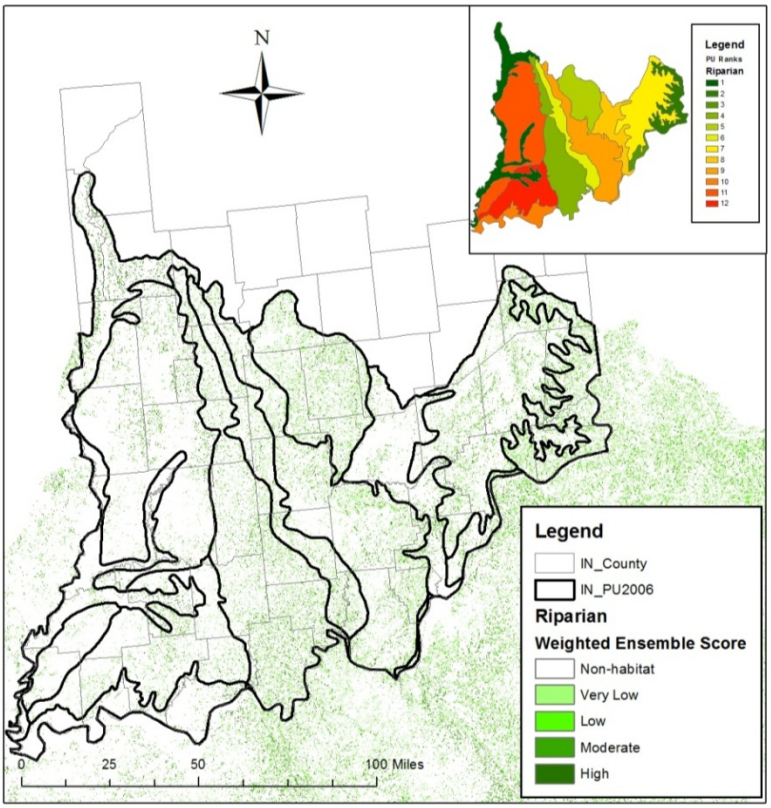


Figure 3. (Q2) Raw scores from the combination of Riparian species habitat models (n=4) weighted by the priority class of each species. Mean scores for each planning unit were used to produce ranks (inset) from high (1) to low (12).

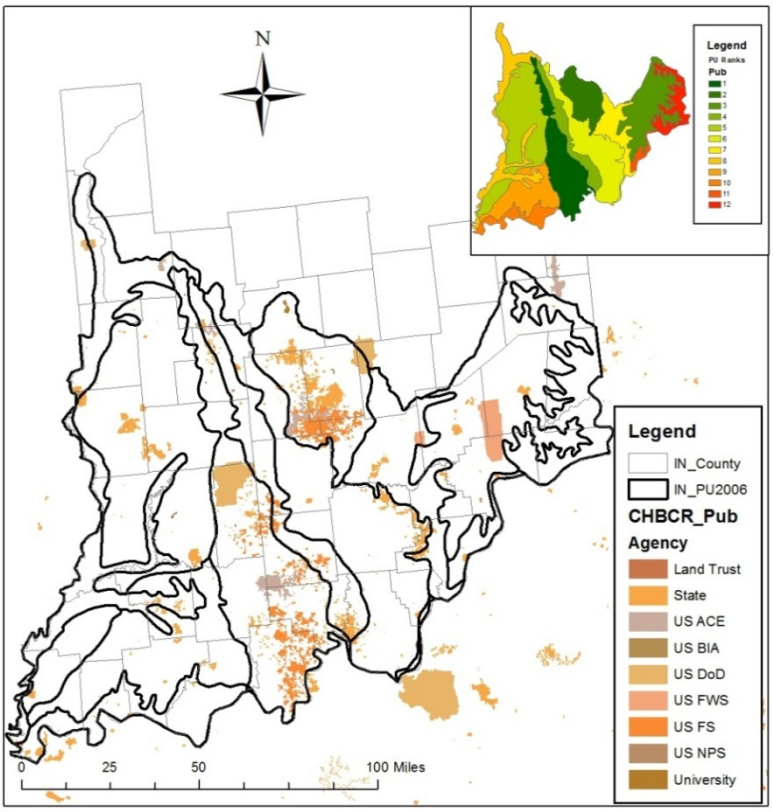


Figure 4. (Q3) Distribution of public lands within the Indiana Sub-region by agency or organization. Total area of public ownership for each planning unit was used to produce ranks (inset) from high (1) to low (12).

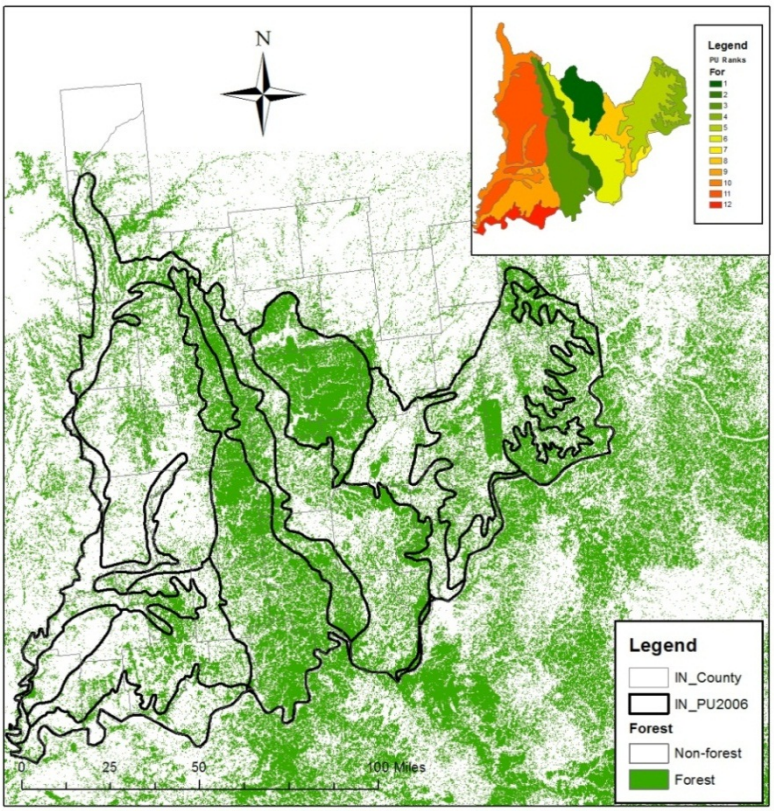


Figure 5. (Q4) Distribution of lands classified as a forested type within the Indiana Sub-region by the 2006 NLCD. Proportion of forested land for each planning unit was used to produce ranks (inset) from high (1) to low (12).

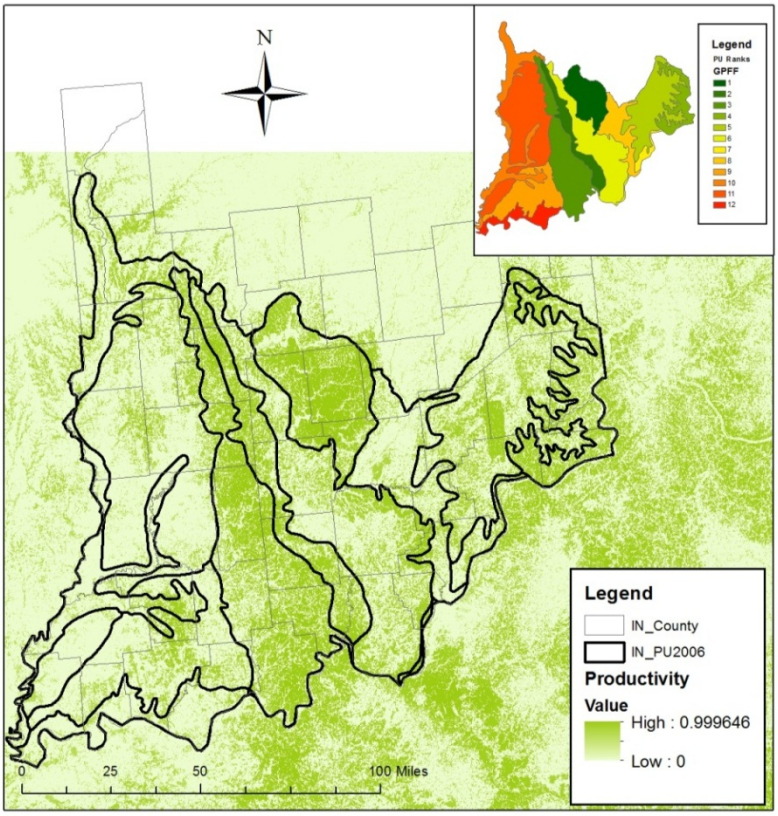


Figure 6. (Q4) Fragmentation of forested lands as measured by the General Productivity Index within the IN Sub-region. Mean index score on forested lands for each planning unit was used to produce ranks (inset) from high (1) to low (12).

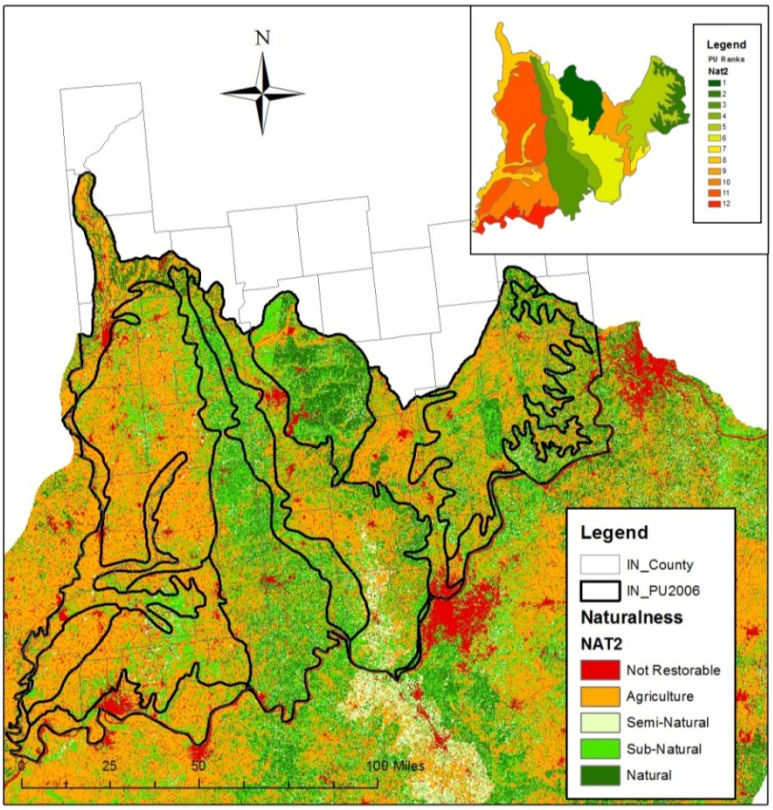


Figure 7. (Q4) Classification of the relative naturalness of lands within the Indiana Sub-region following Ferrari et al. 2008. Proportion of each planning unit in the "Natural" class was used to produce ranks (inset) from high (1) to low (12).

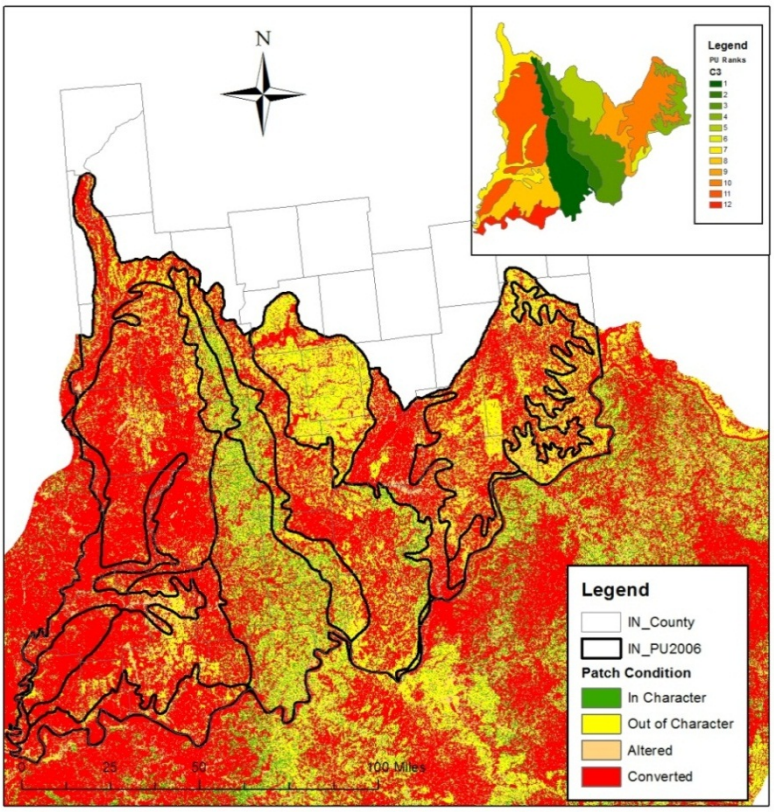


Figure 8. (Q4) Comparison between current and expected landscape patch conditions within the Indiana Sub-region. Proportion of each planning unit in the "In Character" class was used to produce ranks (inset) from high (1) to low (12).

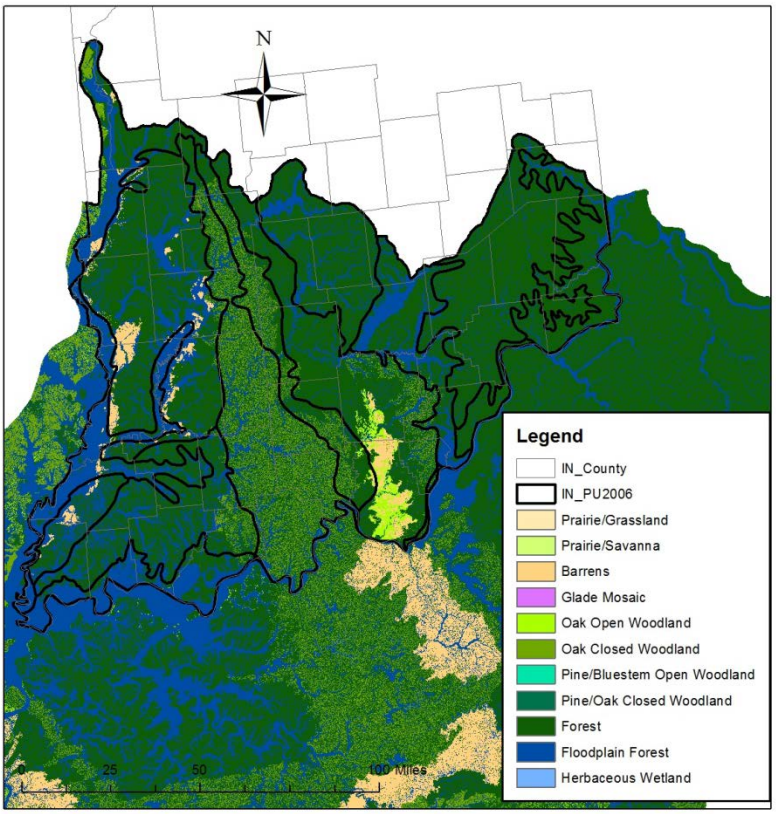


Figure 9. (Q5) The distribution of sites suitable for the restoration of broad natural communities within the IN Sub-region.

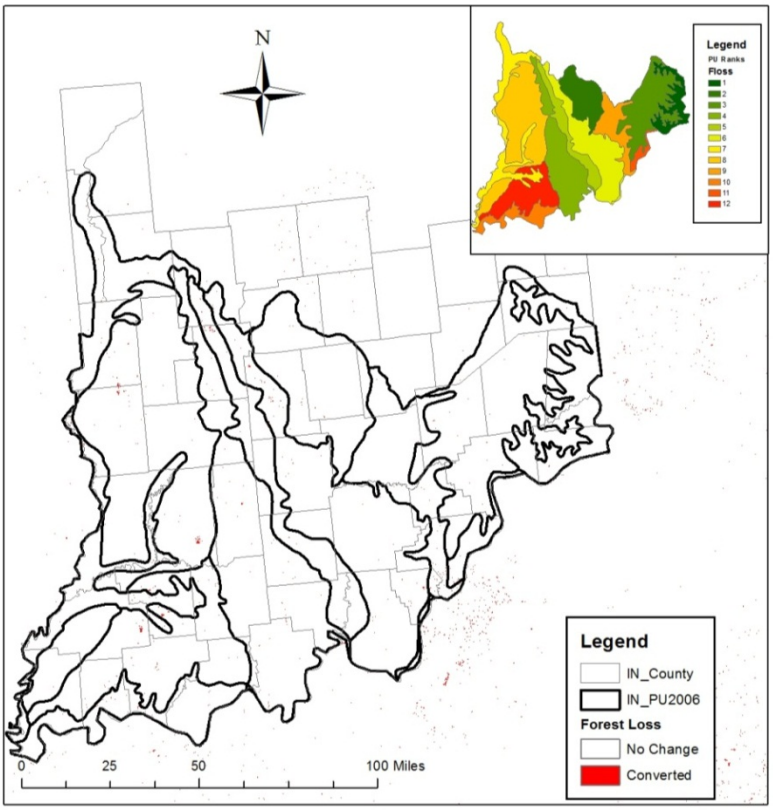


Figure 10. (Q6) Locations where cover class changed from a forest type to a non-forest type in 2006 within the IN Sub-region. Proportion of forest converted in each planning unit was used to produce ranks (inset) from low (1) to high (12).

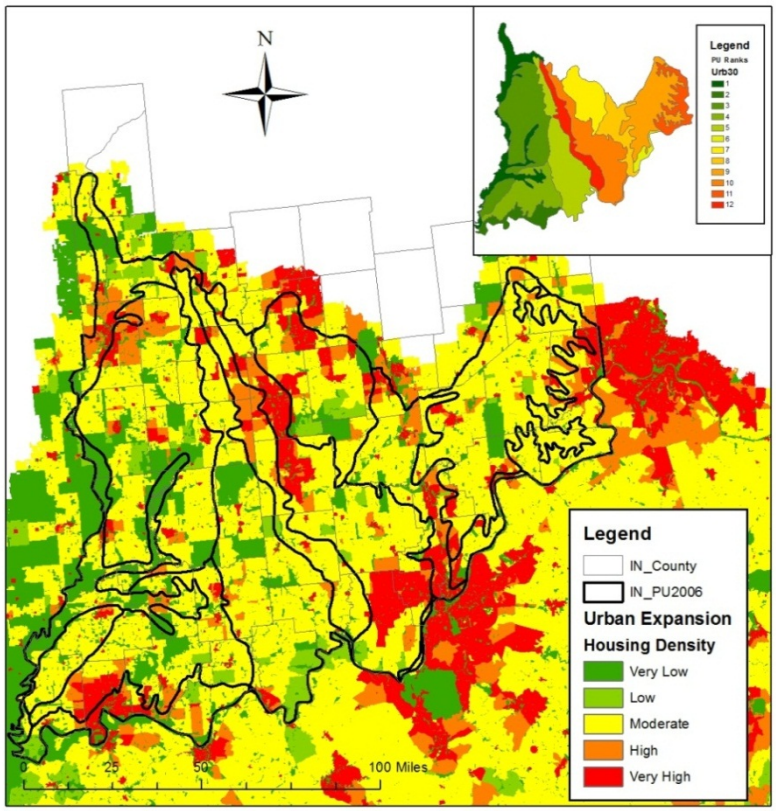


Figure 11. (Q6) The relative impact of current and projected housing density on management actions within the IN Sub-region. Proportion of each planning unit in the "Very Low" class was used to produce ranks (inset) from high (1) to low (12).