

From: [Marshall, Michael E](#)
To: [Reid, Rebekah N](#); [Endries, Mark](#); [Stephanie DeMay](#); [Becker, Drew N](#)
Subject: Future Conditions for HENA
Date: Friday, March 16, 2018 9:34:02 AM
Attachments: [HENA SSA_Future Conditions Brainstorm.docx](#)
Importance: High

Good morning!

I thought yesterday's call was super productive! Thanks a bunch!

As promised, I typed up a short brainstorm meant to capture our conversation yesterday and forge a path forward for our last section. Take a look and give me your thoughts/impressions.

Mark, you will see reference to a GIS exercise with SECAS Blueprint....if you think the idea is soild, let me know, and I can send along the shapefile.

Thanks!

Mike

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Mike Marshall
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Alternate email: mmarshall@ag.tamu.edu

Work Schedule 1st Week

Monday-Thursday --> In Office 7:30-4:30 CST

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HENA SSA: Future Conditions Approach

There are 2 main primary risk factors to consider in a future conditions analysis for HENA: development and climate change. We will assess development in a quantitative fashion using the SLEUTH model projections out to 2040. The effects of climate change will be approached in a qualitative fashion using a narrative approach. Because the actual impacts of urbanization are unknown, we will use 3 scenarios to capture the uncertain relationship to a populations resiliency: Status Quo, Targeted Conservation, and High Development Impact. We will use the HENA habitat model and expert input to inform possible new sites where HENA might be found or introductions may occur under the conservation scenario. We will assess areas where development may impact HENA in 2 ways:

- % increase in projected development (SLEUTH probability of urbanization >80%) within current populations (from Current Conditions—68 populations)
- % increase in projected development (SLEUTH probability of urbanization >80%) within areas delineated as potential habitat by the Maxent habitat model

Scenarios are as follows:

- Status Quo—More likely than not (although the impacts might be more likely, it is not highly likely that no new populations will be found or established...might consider finding new populations, but a much reduced set over the targeted conservation scenario...for example, we might include a few populations that have current Eos but not used as a current population that NCNHP identify as highly likely to still exist)
 - No new populations found or introduced
 - Protected areas
 - Protected in perpetuity—no impacts from urbanization
 - Voluntary protection/non-perpetuity—population drops 1 resilience rank if % increase in urbanization exceeds >50% threshold
 - Non-protected—population drops 1 resilience rank if % increase in urbanization exceeds >25% threshold; population drops 2 resilience ranks if % increase in urbanization exceeds >50% threshold
- High Development—Not likely (high level impacts not likely because HENA populations seem to be somewhat resilient to urbanization; not highly likely that no new populations will be found or established)
 - No new populations found or introduced
 - Protected areas
 - Protected in perpetuity— population drops 1 resilience rank if % increase in urbanization exceeds >50% threshold
 - Voluntary protection/non-perpetuity— population drops 1 resilience rank if % increase in urbanization exceeds >25% threshold; population drops 2 resilience ranks if % increase in urbanization exceeds >50% threshold
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urbanization exceeds >50% threshold; extirpation of populations if % increase in urbanization exceeds >90% threshold.

- Targeted Conservation—More likely than not (although it is likely there are more HENA populations out there, it is unlikely we can predict where these would occur; status quo impacts from urbanization are used in this scenario)
 - New populations are found/established (NCNHP input into planned/focal areas; focus on populations with current Eos that were not included in Current Conditions; look at areas of high probability of HENA presence from model ad overlap with SECA high priority areas)
 - Protected areas
 - Protected in perpetuity—no impacts from urbanization
 - Voluntary protection/non-perpetuity—population drops 1 resilience rank if % increase in urbanization exceeds >50% threshold
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What do we need?

- Mark's Excel Output needs to be updated with a few items:
 - Include the missing 28 populations
 - Include a column indicating protected or not, and what level of protection
 - Produce an excel sheet that looks much like the population/SLEUTH sheet, but with acres (and % increase) of urbanization on potential habitat, by Maxent category.
- Follow up with NCNHP with a few items:
 - Which populations that we did not include because of older EO data are likely to still persist?
 - Where are some areas that they feel could be good additional HENA sites in the future?
- GIS task
 - For Mark—can we overlay the SECAS Blueprint shapefile on top of the Habitat Model and see where the high end Maxent category overlaps areas indicated as “high” for SECAS? These areas would represent more areas of opportunities...in the SSA, we could include the total acreage of overlap, plus a map of where these areas of overlap occur. Thoughts?

From: [Reid, Rebekah N](#)
To: [Marshall, Michael E](#)
Cc: [Endries, Mark](#); [Stephanie DeMay](#); [Becker, Drew N](#)
Subject: Re: Future Conditions for HENA
Date: Friday, March 16, 2018 3:22:02 PM
Importance: High

Mike,

I think your summary captures what we discussed. Mark sent me the updated spreadsheet. I'm working to add the protection info and I'm down to the ones that require a little investigation. I'll be able to get it to you next week.

Thanks.

Rebekah Reid

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On Fri, Mar 16, 2018 at 9:34 AM, Marshall, Michael <michael_marshall@fws.gov> wrote:
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Subject: Re: Future Conditions for HENA
Date: Thursday, March 22, 2018 10:25:48 AM
Attachments: [Area Estimates of HENA populations by Maxent Score Groups.xlsx](#)
Importance: High

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PopNumber	Shape_Area	Maxent 0.4 - 0.6	Maxent 0.6 - 0.8	Maxent 0.8 - 1.0
1	30762	8270	16849	2020
2	36352	4727	16561	0
3	24496	5540	14729	0
23	5676	381	5295	0
29	250028	5276	176098	66564
31	42933	12731	26075	438
32	31227	9936	8973	5872
44	15081	1320	2321	0
59	8173	0	0	0
77	6041	2558	2246	0
93	11311	64	2560	4158
96	131400	9524	104658	0
98	99449	34984	34795	0
99	346615	23599	208610	106509
100	447642	7772	256223	183560
125	20736	360	17841	0
154	33902	605	20383	12250
157	4255	3238	0	0
158	2086	0	2024	62
176	39787	27097	10834	0
177	26951	12644	461	0
178	376734	7237	157109	203420
179	15140	9684	2618	416
206	17338	2481	9755	3701
208	55359	1842	27158	10533
214	95317	19448	51760	15022
216	90951	31779	37326	9417
217	78179	13544	55479	341
227	132625	43426	88227	802
232	59403	2514	39886	15919
243	81113	1968	36206	39849
245	28026	525	19439	7942
247	58384	6246	24426	21803
248	25474	3553	21839	0
252	39607	11428	23326	516
271	36403	5331	18766	8867
272	13221	5084	8137	0
274	29565	5975	20111	3479
275	1788	0	0	0
276	123722	13159	55594	48698
279	1953	0	0	1953
287	7905	0	0	0
291	11095	0	5526	4652
292	15606	11389	0	0
293	7808	31	6223	54

PopNumber	Shape_Area	Maxent 0.4 - 0.6	Maxent 0.6 - 0.8	Maxent 0.8 - 1.0
295	23501	1444	5539	4243
296	7800	0	0	0
297	1891	746	2	0
298	5355	0	0	0
299	323	0	0	0
300	1950	0	0	0
302	120358	9616	74267	34609
303	37307	7229	15086	4963
304	22328	6089	9713	0
306	7800	0	0	0
308	9889	0	0	0
309	4067	0	0	0
311	1490	39	0	0
312	6541	0	0	0
316	43159	981	17956	13027
317	582	0	0	0
318	5396	467	0	0
320	128	0	0	128
321	12740	2271	3557	2123

PopNumber	Shape_Area	Percent Maxent 0.4 - 0.6	Percent Maxent 0.6 - 0.8	Percent Maxent 0.8 - 1.0	Protection Status	
1	30762	26.9%	54.8%	6.6%	1	RC by Spartanburg Water System
2	36352	13.0%	45.6%	0.0%	1	State Heritage Preserve
3	24496	22.6%	60.1%	0.0%	1	NPS, Cowpen NBF
23	5676	6.7%	93.3%	0.0%	3	
29	250028	2.1%	70.4%	26.6%	3	
31	42933	29.7%	60.7%	1.0%	2 (part)	Some plants occur in DOT ROW - no formal binding agreement.
2	31227	31.8%	28.7%	18.8%	2 (part)	DOT ROW - no formal binding agreement
44	15081	8.8%	15.4%	0.0%	1	DOT Mitigation Site - CE
59	8173	0.0%	0.0%	0.0%	2(part)	DOT ROW - no formal binding agreement
77	6041	42.3%	37.2%	0.0%	1	DOT Mitigation Site - Fee
93	11311	0.6%	22.6%	36.8%	3	
96	131400	7.2%	79.6%	0.0%	1 (part)	DOT Mitigation Site - Fee
98	99449	35.2%	35.0%	0.0%	3	
99	346615	6.8%	60.2%	30.7%	2 (part)	RHA (EO76 and EO172)
100	447642	1.7%	57.2%	41.0%	1 (part)	DOT Mitigation Site - Broad River Greenway
125	20736	1.7%	86.0%	0.0%	2	RHA
154	33902	1.8%	60.1%	36.1%	1	DR
157	4255	76.1%	0.0%	0.0%	3	
158	2086	0.0%	97.0%	3.0%	2/3	Some plants occur witin an undermined acreage on DOT ROW - no formal binding agreement.
176	39787	68.1%	27.2%	0.0%	3	
177	26951	46.9%	1.7%	0.0%	3	
178	376734	1.9%	41.7%	54.0%	2	DOT ROW - no formal binding agreement
179	15140	64.0%	17.3%	2.7%	2(part)	DOT ROW - no formal binding agreement
206	17338	14.3%	56.3%	21.3%	3	
208	55359	3.3%	49.1%	19.0%	2	DOT ROW - no formal binding agreement
214	95317	20.4%	54.3%	15.8%	2 (part)	DOT ROW - no formal binding agreement
216	90951	34.9%	41.0%	10.4%	2 (part)	DOT ROW - no formal binding agreement
217	78179	17.3%	71.0%	0.4%	1	DOT Mitigation Site - Fee
227	132625	32.7%	66.5%	0.6%	1	CE with Foothills Conservancy of NC
232	59403	4.2%	67.1%	26.8%	3	
243	81113	2.4%	44.6%	49.1%	1/2 (part)	RHA (EO12) and CE with TNC (EO270)
245	28026	1.9%	69.4%	28.3%	2/3	Some plants may be left in DOT ROW - no formal binding agreement.
247	58384	10.7%	41.8%	37.3%	1 (part)	DOT Mitigation Site - Tate CE (EO106 and EO286)
248	25474	13.9%	85.7%	0.0%	3	
252	39607	28.9%	58.9%	1.3%	?	may have been used as DOT mitigation site - TB was supposed to send info
271	36403	14.6%	51.6%	24.4%	1	CE with TNC
272	13221	38.5%	61.5%	0.0%	3	
274	29565	20.2%	68.0%	11.8%	3	
275	1788	0.0%	0.0%	0.0%	3	Handful of plants in DOT ROW - not enough to count in Cat 2
276	123722	10.6%	44.9%	39.4%	2	Voluntary agreement with Duke Energy
279	1953	0.0%	0.0%	100.0%	3	

1	Perpetuity
2	Not perpetuity
3	No Protection

PopNumber	Shape_Area	Percent Maxent 0.4 - 0.6	Percent Maxent 0.6 - 0.8	Percent Maxent 0.8 - 1.0	Protection Status	
287	7905	0.0%	0.0%	0.0%	1	CE with Pacolet Area Conservancy
291	11095	0.0%	49.8%	41.9%	2(part)	DOT ROW - no formal binding agreement
292	15606	73.0%	0.0%	0.0%	3	
293	7808	0.4%	79.7%	0.7%	3	
295	23501	6.1%	23.6%	18.1%	2 (part)	Hickory Parks and Rec
296	7800	0.0%	0.0%	0.0%	3	
297	1891	39.5%	0.1%	0.0%	3	
298	5355	0.0%	0.0%	0.0%	3	
299	323	0.0%	0.0%	0.0%	3	
300	1950	0.0%	0.0%	0.0%	3	
302	120358	8.0%	61.7%	28.8%	1 (part)	Fee title Catawba Lands Conservancy
303	37307	19.4%	40.4%	13.3%	1/2	Foothills Conservancy of NC (Fee) and RHA
304	22328	27.3%	43.5%	0.0%	1	Foothills Conservancy of NC
306	7800	0.0%	0.0%	0.0%	3	
308	9889	0.0%	0.0%	0.0%	2 (part)	DOT ROW - no formal binding agreement
309	4067	0.0%	0.0%	0.0%	3	
311	1490	2.6%	0.0%	0.0%	1	Pacolet Area Conservancy Easement
312	6541	0.0%	0.0%	0.0%	1	Pacolet Area Conservancy Preserve
316	43159	2.3%	41.6%	30.2%	?	Catawba County Open Space
317	582	0.0%	0.0%	0.0%	3	
318	5396	8.7%	0.0%	0.0%	2 (part)	DOT ROW - no formal binding agreement
320	128	0.0%	0.0%	100.0%	3	
321	12740	17.8%	27.9%	16.7%	3	

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To: [Reid, Rebekah N](#)
Cc: [Endries, Mark](#); [Stephanie DeMay](#); [Becker, Drew N](#)
Subject: Re: Future Conditions for HENA
Date: Thursday, March 22, 2018 10:36:55 AM
Importance: High

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So...for our conversation on Future Conditions, is there still an anticipation to create 2 excel products that look something like this:

Current Populations--a sheet just like Mark produced already (SLEUTH projections out to 2040....we focus on the 80% or more probability of urbanization....and look at the % increase in urbanization from current to 2040)....additions to that original sheet would be 1) add the populations that were missing (approx. 27-28 pops missing), and addition of the column of protection (1, 2, and 3).

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Does that make sense?

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Hi Michael,

Yes, percentage of total area within each Maxent score class. No SLEUTH.

The spreadsheet that I sent can be summarized to group the 80% and above with the data that is there. The missing populations have 0 SLEUTH overlap.

I can build the spreadsheet that shows the maxent cutoff values and SLEUTH. I should be able to get that out today.

Thanks!

Mark

Mark Endries

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Attachments: [TA_MaxentClass_SLEUTH40.xlsx](#)
Importance: High

Hi All,

Please see the attached spreadsheet. It reports the total area of Maxent potential habitat in the 3 classes and how much of that is removed by the SLEUTH categories, in both area in meters and percent of total. I kept all the categories of SLEUTH separate in case we might need this / change parameters down the road. I also included a column where I summed 80% and greater. For the percent of total of 80% and greater I summed this by the individual class and all potential habitat. Please let me know if you have any questions.

Thanks!

Mark

Mark Endries

USFWS
160 Zillicoa St
Asheville, NC 28801
Office: 828.258.3939 ext. 231
Mobile: 828.215.1740

On Fri, Mar 23, 2018 at 8:33 AM, Endries, Mark <mark_endries@fws.gov> wrote:

Hi Michael,

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Mike

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Thanks.

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[illegible]

Maxent Score	Total Area	SLEUTH 1%	SLEUTH 2.5%	SLEUTH 5%	SLEUTH 10%	SLEUTH 20%	SLEUTH 30%	SLEUTH 40%	SLEUTH 50%	SLEUTH 60%	SLEUTH 70%	SLEUTH 80%	SLEUTH 90%	SLEUTH 95%	SLEUTH 97.5%	SLEUTH 100%		80% and greater
0.406 - 0.6	706380300	10.01%	0.65%	1.16%	1.12%	1.37%	1.02%	0.84%	0.82%	0.85%	0.79%	0.93%	1.20%	0.97%	0.63%	4.57%		8.29%
0.6 - 0.8	501952500	10.03%	0.66%	1.15%	1.13%	1.35%	0.98%	0.78%	0.76%	0.77%	0.75%	0.83%	1.13%	0.84%	0.58%	4.00%		7.39%
0.8 - 1	91774800	7.88%	0.57%	1.14%	0.98%	1.25%	0.96%	0.76%	0.67%	0.72%	0.67%	0.72%	1.02%	0.85%	0.57%	3.77%		6.94%

From: [Marshall, Michael E](#)
To: [Endries, Mark](#)
Cc: [Reid, Rebekah N](#); [Stephanie DeMay](#); [Becker, Drew N](#)
Subject: Re: Future Conditions for HENA
Date: Wednesday, March 28, 2018 1:46:06 PM
Importance: High

Hey guys,

Just an update....I've written up a rough version of our approach to the scenarios and the assumptions we are making....my next step will be to write up the results based on Mark's modelling exercise.....

Rebekah, whenever you hear back on those populations that have likely persisted even though they haven't been detected in >10 years, and also prospective new sites, let me know.....those are going to be a big part of the results of the Status Quo and Conservation scenarios.

Thanks!

Mike

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