Fitzgerald, Katherine <katherine_fitzgerald@fws.gov>

Refined PATCH outputs ready

Heather Rustigian-Romsos <heather@consbio.org> Fri, Nov 15, 2013 at 3:32 PM
To: "Fitzgerald, Katherine" <katherine_fitzgerald@fws.gov>, Wayne Spencer <wdspencer@consbio.org>, Scott Yaeger <scott_yaeger@fws.gov>

Hi Katherine,

Attached is a long-winded response to these questions, with example maps and graphs. I apologize if I am confusing, and am happy to discuss if it would be helpful.

But here is the gist, in bold below.

Interesting things to think about & explore!
-Heather

On 11/7/2013 2:26 PM, Fitzgerald, Katherine wrote:

> Hi Heather,
>
> I've been staring at the PATCH output maps and trying to figure out what they are telling us about the N CA/ SW OR population. I have a few questions.
>
> How did you seed the population in the first year? That is, how many individuals did you start with and where? Can you tell if this makes any difference in your last-50-years results?

We seeded the initial population in territories that contained detections used in building the habitat model.
There were just under 300 of those, so we started with 300 adult females. It does make a difference, in population size and distribution.

> Your powerpoint says that run length varied by time to equilibrium. How did you (or PATCH) define equilibrium? I assume this means that the population was relatively level during the years of the simulation. Was it pretty level throughout the last 50 years?

I defined it by doing some test runs for every territory size and ceiling combination. I would run replicates and then graph # adults by year, and look to see how long a run needed to be to include 50 years after the population leveled out. If it appeared to still be increasing, I would run for longer. I think they are pretty level after that point, but there is some stochastic up/down, but we have the 20 replicates to account for that variation.

> It seems odd to me that at equilibrium, there would still be a good deal of unoccupied high quality habitat available, e.g. in the N. Sierra. Do you have a sense of why the model turned out this way? Were the remaining unoccupied high quality patches just too far from source territories?

Yes and no! I test this in the attachment. I believe they are not reaching the northern Sierra section because the higher quality patches are too far from the source territories. But when I force siting to this area (by increasing the initial population by 5 and siting at highest scoring territories which include this area), these hexagons are occupied, but at low frequency and the population size is actually lower. My guess is that it is the isolation. (Restoration potential to improve connectivity/habitat quality in between these areas??).

I'm not sure you're in the office right now-- there's no giant hurry here, but if you get a chance to give me your thoughts it will help me think (and hopefully write) more clearly about what we know about this population.

best,
Katherine

--
Katherine Fitzgerald
Wildlife Biologist
U.S. Fish and Wildlife Service
Yreka Fish and Wildlife Office
(530) 842-5763 ext 111

On Tue, Oct 1, 2013 at 11:09 AM, Heather Rustigian-Romsos <heather@consbio.org> wrote:

> Hi everyone-
>
> We sorted through your helpful comments to create a new round of PATCH models, refining our territory sizes and ceilings.
> I have posted 2 powerpoints, one for NCAL and one for SSN on the CBI ftp site (details below).
> We are especially interested in your responses to the key questions posed on slide 3 of each.
> Let me know if you have any problems accessing the file.
>
> Thanks so much for your continued assistance and valuable feedback,
> Heather
>
> http://ftp.consbio.org/home/pub/shared/Heather/fisher_PATCH_updates_Oct1.zip
>
> Username: guest
> Password: xDr3728
>
> --
> Heather Rustigian-Romsos
> Conservation Biologist, GIS Analyst
> Conservation Biology Institute
> 136 SW Washington Ave #202
> Corvallis, OR 97333-4408
> Phone: 541-368-5803 (direct), 541-757-0687 (main office)
> Fax: 541-752-0518
> www.consbio.org

--
Heather Rustigian-Romsos
Conservation Biologist, GIS Analyst
Conservation Biology Institute
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Corvallis, OR 97333-4408
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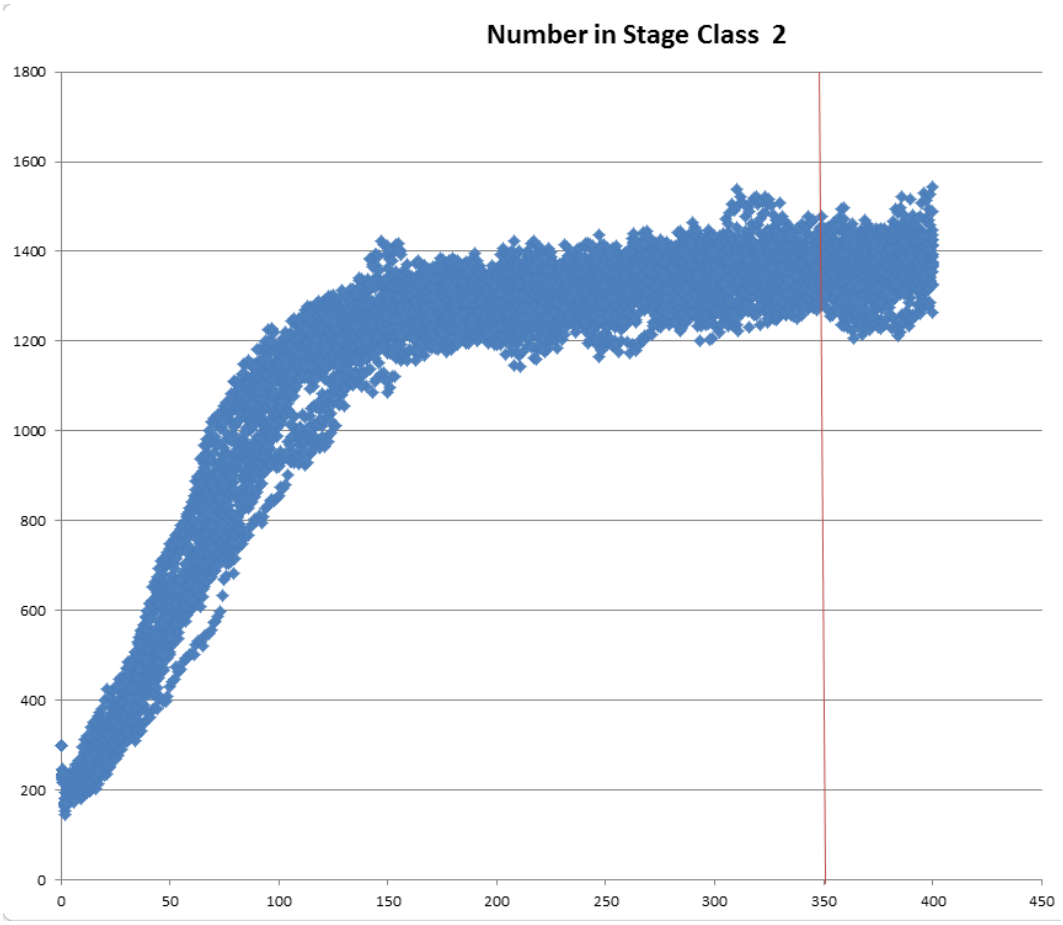
1. **Defining equilibrium** – do exploratory runs for each territory/ceiling combination, graph number of stage class 2 females by year, until running long enough that population is relatively level for more than 50 years. Tallied Example – 750 ha territories, upper 40% ceiling, run for 400 years with results tallied (to map occupancy and sources) over years 351 – 400:



2. **Influence of initial population size and location -**
   For year 1 seeding of the population –

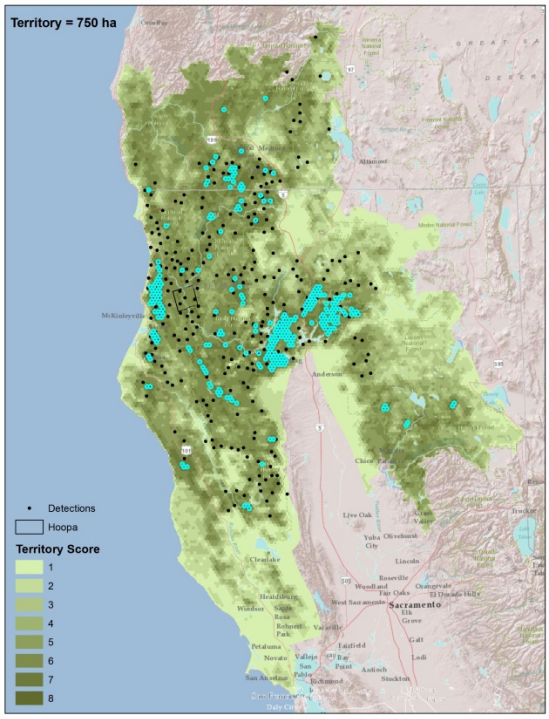
   I 'forced of siting for year 1 by inflating hexagon scores (so they were greater than the maximum) for hexagons containing detections used in model calibration for year 1 habitat map used by PATCH. After year 1, the unaltered habitat value hexagon map was used. The initial population is all at stage 2 (adults), I used an initial

populations size of 300, just over the 293 hexagons containing filtered detections used in habitat model building within regions2/3.

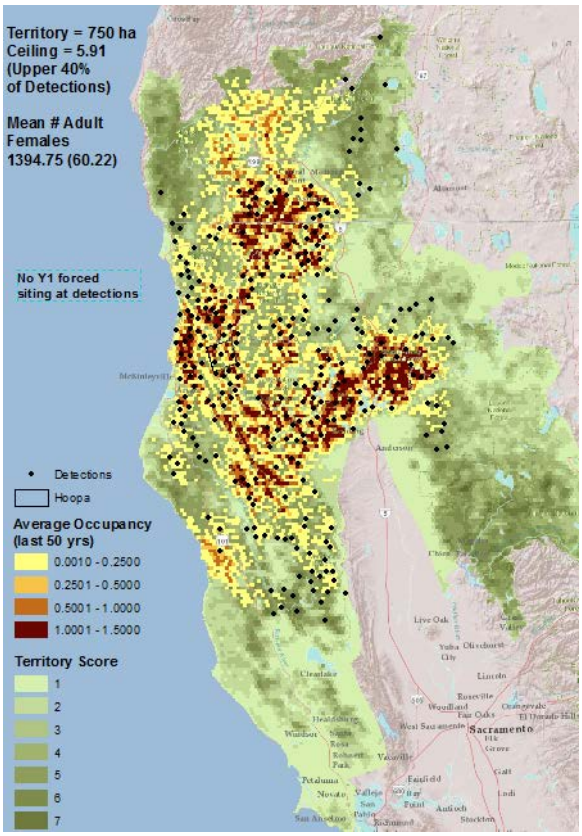
Effects of initial population placement on the landscape:

The placement of the initial population does influence the results. When I first ran for this region and placed the initial population of 300 at the best hexagons without forcing the siting to detections, the population never made it out to hexagons on the fringes that we know are occupied.

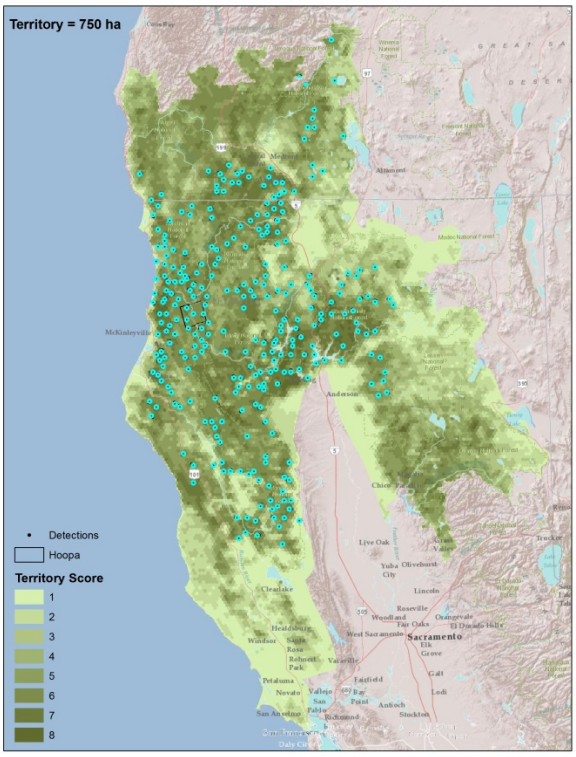
This map shows the top 300 hexagons, where initial pop would be sited without forcing (aqua highlights):



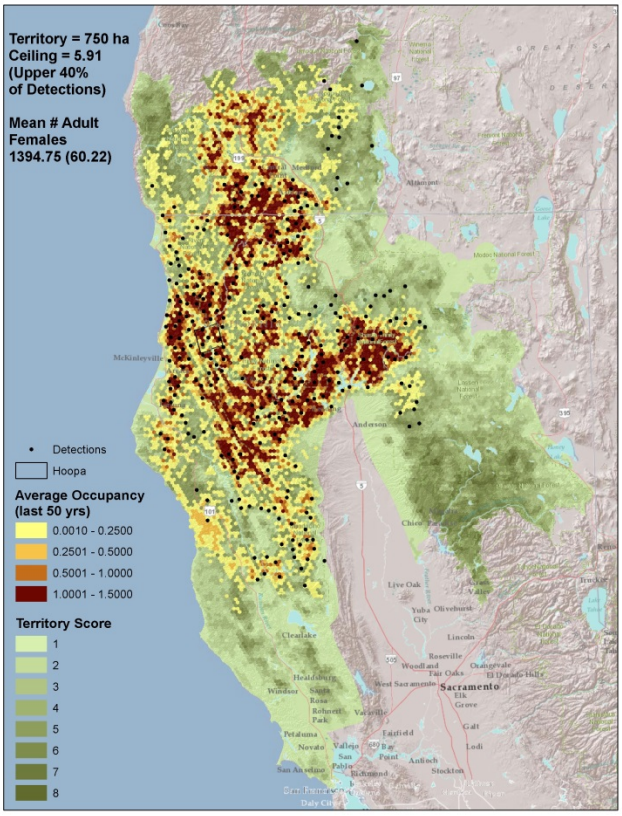
Results in this occupancy pattern (without forcing at y1 to hexagons containing detections), avg number of adult females last yr = 905):



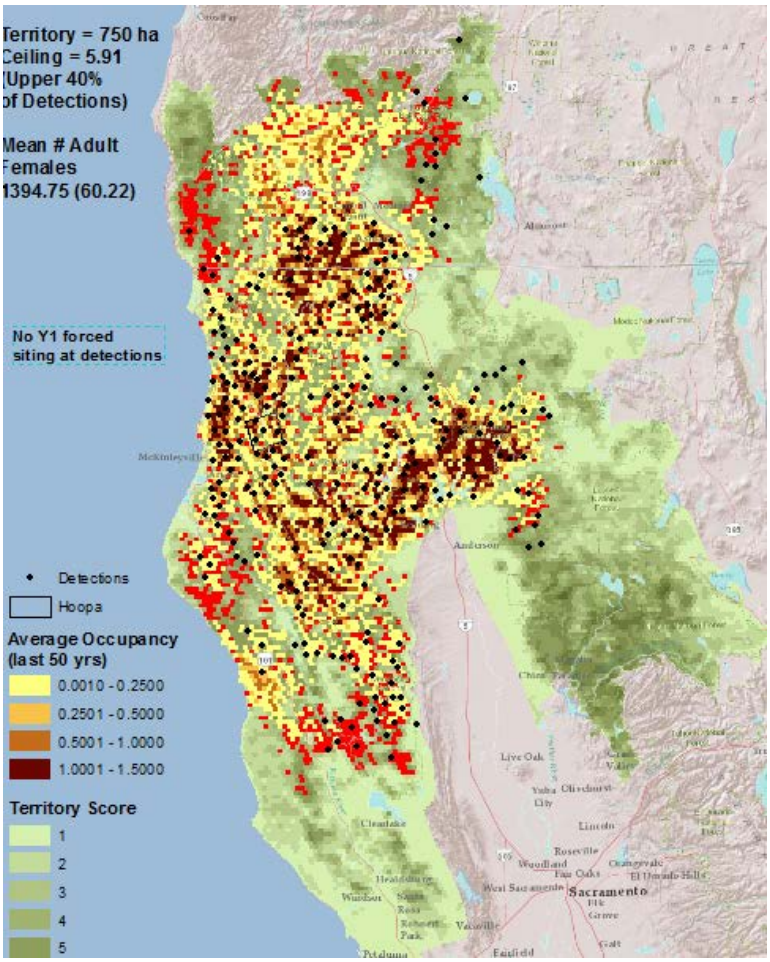
Here is where we force them to start by manipulating the year 1 habitat map:



Occupancy based on forcing: (avg number of adult females last yr = 1394):



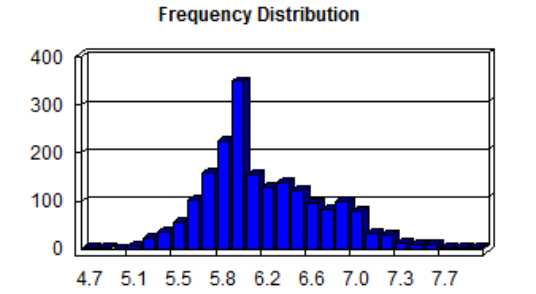
These hexagons in red are occupied when siting is forced to detections but not if just put at 300 best scores:



Why not occupying all suitable territories if run to equilibrium (750 ha, 40% ceiing, forced siting yr 1)?

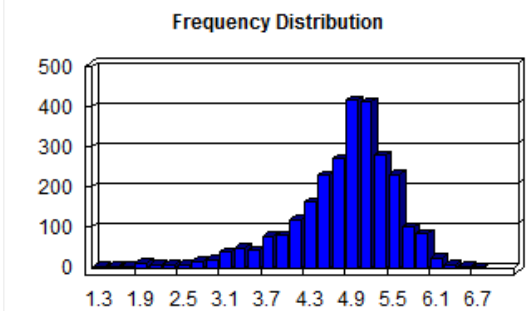
Occupancy >= 0.5

Mean score = 6.235692
Stdev = 0.490858
Min = 4.7135
Max = 8
N = 1960



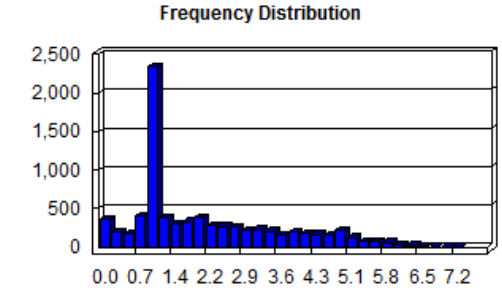
Occupancy > 0 and < 0.25

Mean score = 4.836111
Stdev = 0.754575
Min = 1.2532
Max = 6.7397
N = 2710

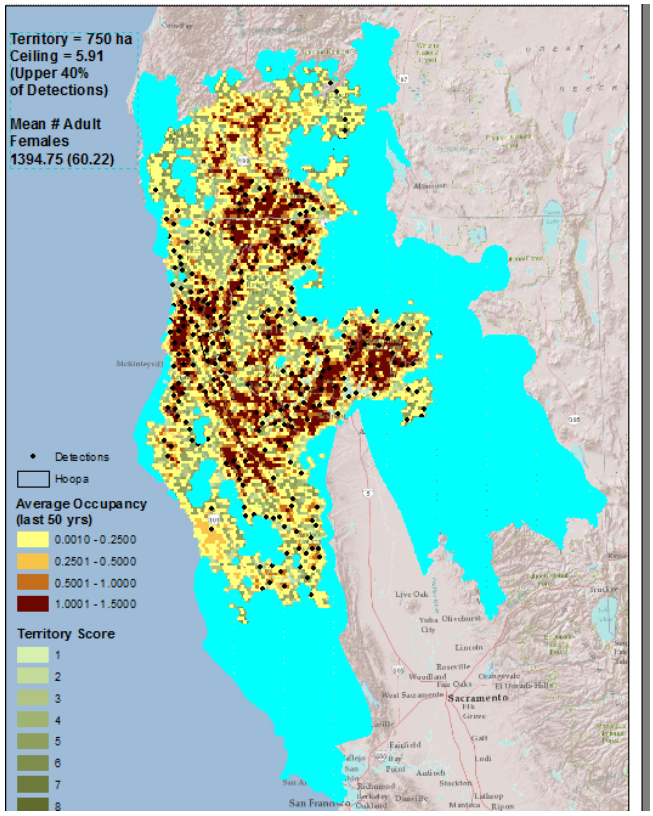


Occupancy = 0

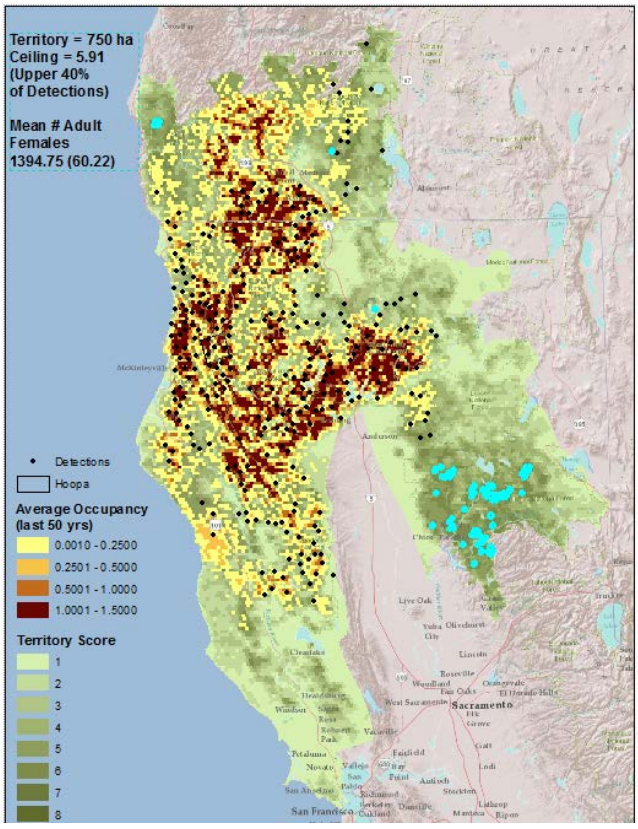
Mean score = 2.082138
Stdev = 1.504217
Min = 0
Max = 7.4008
N = 7749



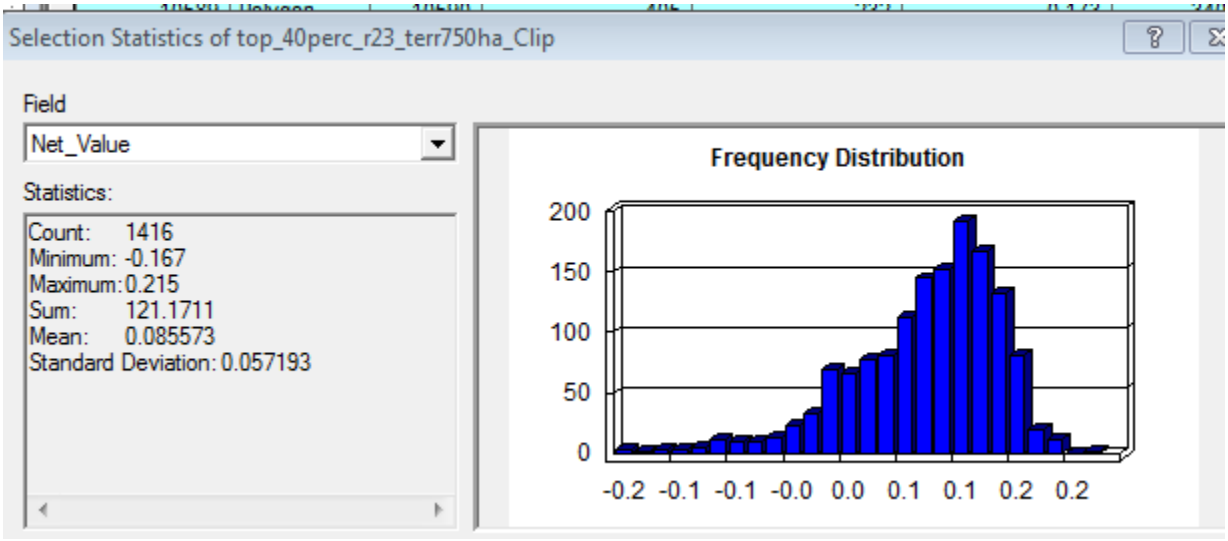
Occupancy = 0



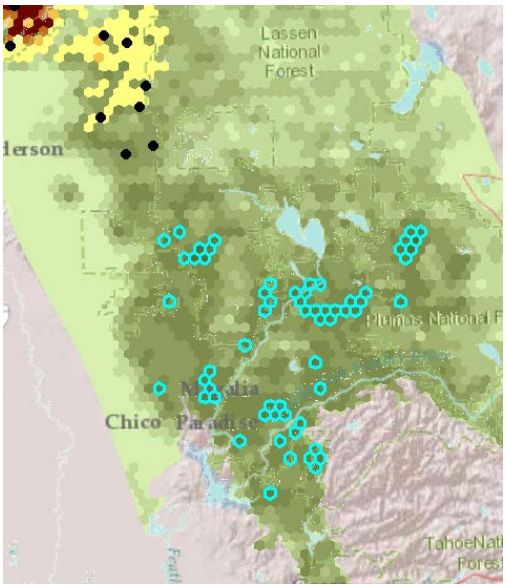
Occupancy = 0 and score >= 6.0:



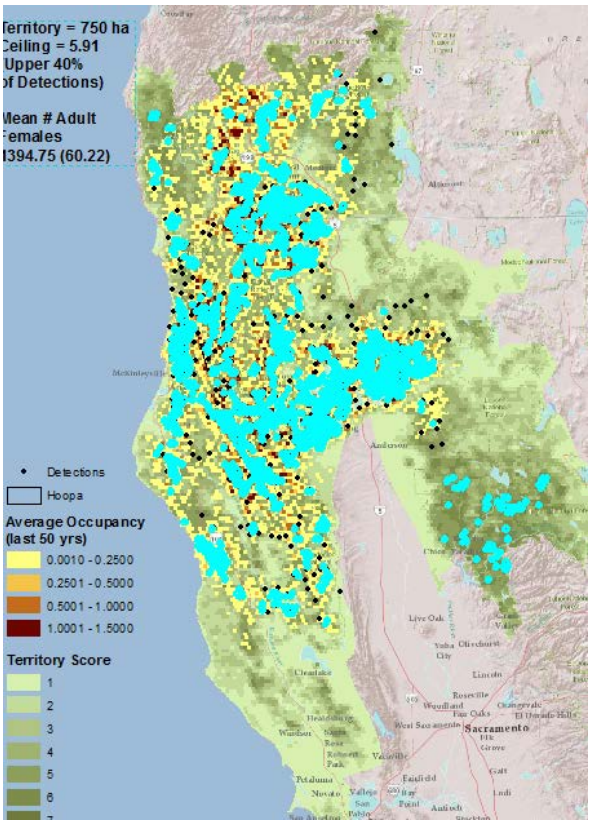
For occupancy > 0, score >= 6.0, majority source territories (net value > 0)



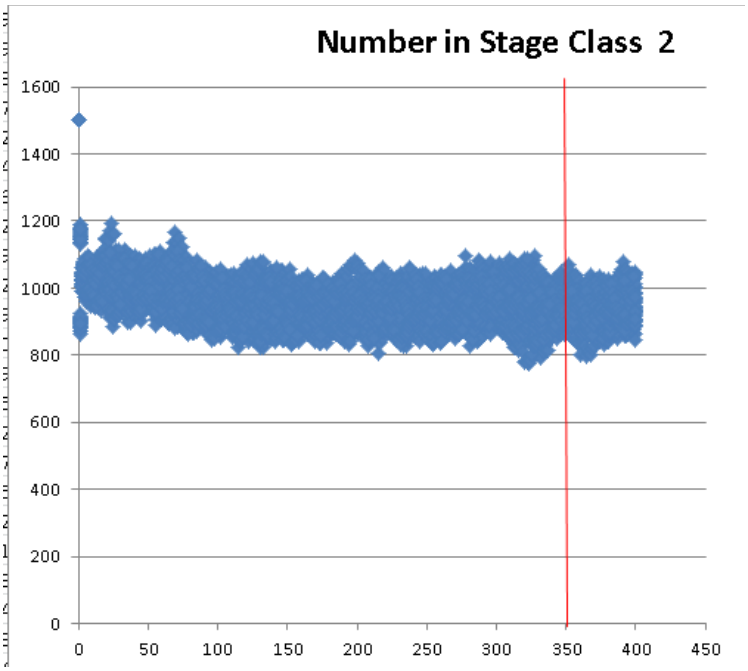
I think they are just not reaching most of the high quality unoccupied territories (max dispersal distance = 7 territories).



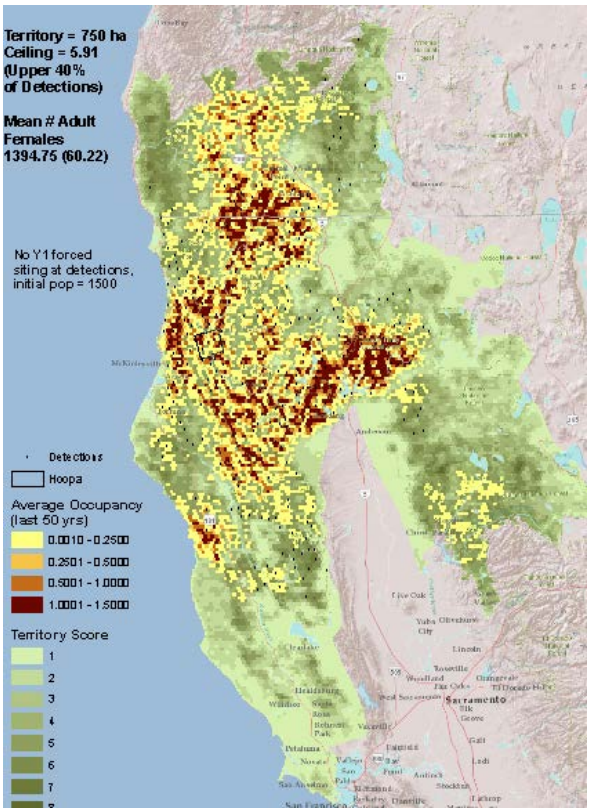
Test this by seeding y1 at best territories and using initial pop = 1500 (1483 hexagons have score >= 6.0). This is where an initial pop of 1500 sited at best territories would be:



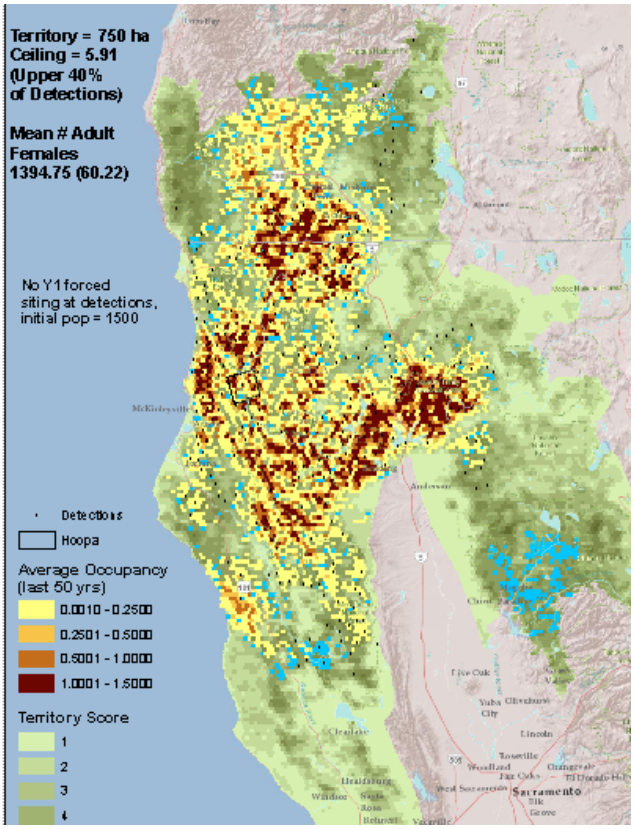
If this results in a larger pop more distributed, this could be argument that pop won't expand without assistance? i.e. stirling tract reintro?



Mean # adult females = 944.8 (less than when forced siting of initial pop of 300 to detections, close to what it was with no forced siting but initial pop of 300).



Light Blue = occupied when initial pop = 1500 but not when initial pop is 300.



<u>Effects of initial population size:</u>

In the past we have found that the number does not really affect results – if you have too large a number, the population crashes and increases to a stable equilibrium, given that the runs are long enough, too small, then it will slowly increase to a stable equilibrium, again given that the runs are long enough. However, this is for the SSN where the population appears saturated and is predicted habitat distributed in a consistent linear fashion without significant gaps. In those runs, once we allowed the population to expand to unoccupied areas north over the Merced, the population slowly crept northward.

Conclusion: It doesn't seem like the initial pop size is having much affect here, but the placement does influence which territories are occupied. I think the approach we used may do a good job at depicting areas currently 'naturally' occupied.