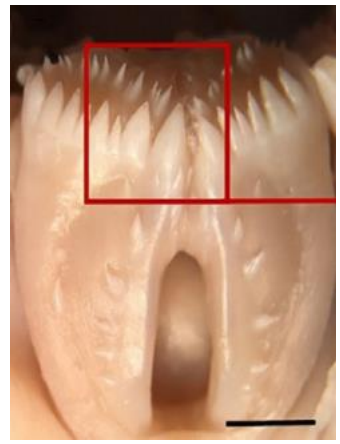
# Pheasant News and Notes
## September 2020

### Trivia Question
What is the structure at right (the whole thing, not just what's in the box)?

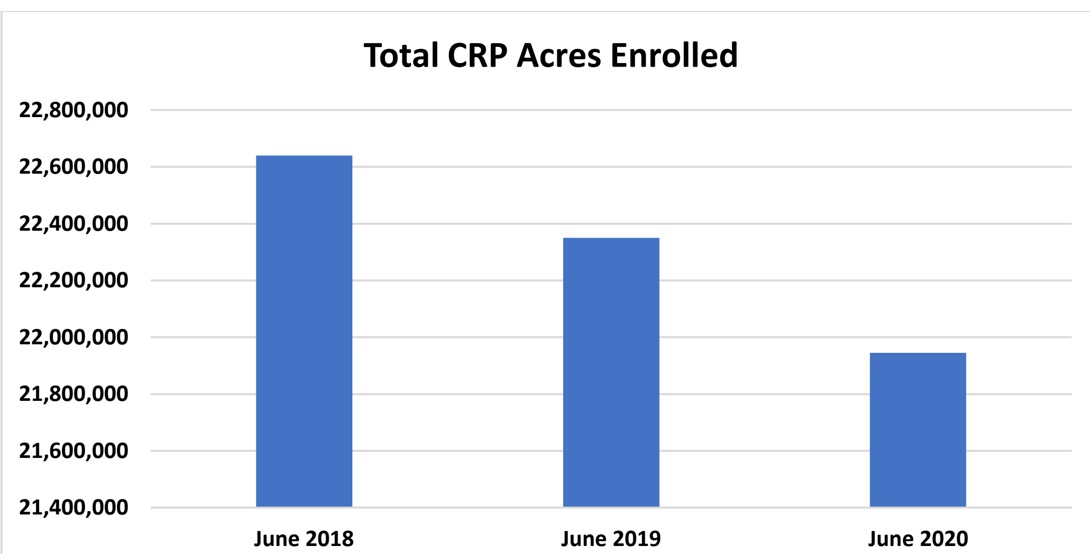


### Farm Bill and USDA News
August was a slow news month with Congress in recess and the President's executive orders removing the immediate impetus for a compromise Covid relief bill. Negotiations with potential conservation consequences will likely resume this month.

USDA-FSA extended the signup period for the Soil Health and Income Improvement Program (SHIPP) to November 20th. The signup started March 30th and was originally set to end August 21st. Only 50,000 acres are being offered among five states (MT, ND, SD, MN, and IA) on a first-come first-served basis, so the extension means that interest in the program has not been what was once hoped. Sort of the general theme for CRP under the 2018 Farm Bill.

Also, Jim Inglis (Management Board, Pheasants Forever) passed along that USDA published its final rule regarding wetlands and conservation compliance last week. I don't think any of the changes to the previous rule are causes for concern, but your agency's farm bill folks can make that call.

Finally, USDA added several new monthly updates to their CRP statistics webpage, the most recent of which is for June. Below shows the direction we are headed in acreage-wise.



## Notes from Around the Pheasant Range

The 2020 pheasant hunting forecasts are starting to trickle in. States like Nebraska and (now) South Dakota that don't use August roadside survey results in their forecasts already have them available, and states that do will have theirs available soon. We will be able to see at the end of the month if any regional trends emerge.

Thanks to invitations from Jeff Prendergast (Technical Committee, Kansas) and Travis Runia (Technical Committee, South Dakota), several of us attended two recent graduate defense webinars involving pheasant studies. Alixandra Godar defended her work on pheasant use of cover crops at Kansas State, and Michael Sundall defended his study of neonicotinoid effects on pheasants at South Dakota State. Regarding the latter, Sundall showed that pheasants generally avoided eating neonic-treated seeds (corn) when given a choice, but some wild hens were found to have ingested treated seeds and had elevated neonic concentrations in their livers. In a captive experimental setting, hens fed high numbers of treated seeds had lower survival, nest initiation, and chick survival. In the other study, Godar found that CRP was the most selected cover type by radio-tagged hens across all (spring and summer) time periods, but ag fields with cover crops were also selected by brood-rearing hens. Models suggested the availability cover crops may lead to higher population growth rates, but overall rates of hen survival and nest success were low compared to other studies. Both Sundall's thesis and Godar's dissertation are now final and available online.

I recently "attended" the National R3 Symposium. The whole thing was recorded if you are interested in the details, but here are a few of my notes:

- Thirty-four percent of total consumers are spending more time outdoors due to Covid-19
- According to the National Shooting Sports Foundation, gun sales from January to July hit a record 12.1 million, with 5 million of these to first-time gun owners. (Those sales apparently haven't officially hit the PR fund yet, though; thanks to Jeff Prendergast for the link.)
- According to the American Sportfishing Association, fishing participation is also up and equipment shortages have been common. Forty percent of fishing equipment is made in China, so Covid-related supply chain problems have caused supply to lag behind demand.
- Some agencies expect interest in hunting and other wildlife-related recreation to increase from previous levels, for the same reasons that fishing increased earlier in the year.
- AFWA is funding a multi-state grant for some MAFWA states to jointly develop a small game R3 diversity and inclusion toolkit. The toolkit will be developed and tested within 3-5 target regions in the Midwest. Women and people of color will be the focus, and work products include inclusive marketing imagery promoting small game hunting participation, social media resources in English and Spanish, and focus group research conducted by DJ Case. Results and resources will be available to all AFWA-affiliated states to use.
- Other new AFWA multi-state R3 grants include:
  - Developing a toolkit for college-based R3 programs
  - Helping the Archery Trade Association partner with Steve Rinella and Meateater to develop influencer-based marketing content and opportunities
  - Helping the National Wild Turkey Federation develop a national advertising campaign to promote hunting and shooting, including development of memorable "sticky" messages
  - Helping fund Partner with a Payer program activities
  - Helping continue development of Hunters Connect instructional videos

- The economic activity generated by the U.S. Latinx population is greater than the GDP of India, and by itself would have the 7th largest GDP of any "country" in the world. Advertising content oriented towards Latinx communities should cover educating consumers, validating decisions, and showing partnerships with trusted companies/creators.
- Several small businesses are emerging around the country to connect landowners to hunters and other recreationists willing to pay for access. These often include some kind of membership fee for the service, as well as a web-based mapping interface to help hunters find properties.
- The National R3 Implementation Workgroup was formed to create and implement the 2016 National Hunting and Shooting Sports Action Plan. The Workgroup has created best management practices for developing R3-related partnerships, a marketing guide website, a mentor program evaluation tool, hunting and fishing license dashboards, and most recently, a searchable clearinghouse for this and all other R3-related information and resources. Agencies and other partners are asked to download content on the clearinghouse for others to use.
- Matt Dunfee (Wildlife Management Institute), Rob Southwick (Southwick Associates), and Phil Seng (DJ Case and Associates) recently completed a study to develop recommendations about R3 mentoring programs. Among their findings:
    - An estimated 50 million people in the U.S. who currently do not hunt or shoot have at least a moderate interest in doing so under the supervision of a mentor.
    - Prospective students do not like the term "mentor," so program developers should replace the term with "instructor."
    - Neither current/potential instructors nor potential students expressed a preference for interacting with individuals of any specific age or gender (cultural or ethnic preferences were not measured).
    - Majorities of hunters and shooters are not interested in instructing beyond what they do organically within their family and social circles. Those that *are* interested often had not done so because no one had asked.
    - Safety is a top priority and requirement for those wanting hunting and shooting instruction.
    - Providing access to areas for those learning to hunt and shoot may be one of the most effective ways to increase the amount of instruction that occurs.
    - "Supplying myself with meat" is the top motivation chosen by those who would like to learn to hunt with an instructor. The sustainable and local food movements provide a rich recruiting ground for potential hunters.

Interesting to see that the American Ornithological Society is changing the names of its two journals. Beginning with the first issues of 2021, *The Auk* will become *Ornithology* and *The Condor* will become *Ornithological Applications*. Both current names have been in use since the late 1800s. In other renaming news, the McCown's longspur is now the thick-billed longspur, and more changes are desired by some.

Finally, the following material is mainly to start a conversation with the Technical Committee members. If you are not interested in the sausage-making of trying to relate large-scale pheasant numbers to habitat quantity and quality using imperfect data for both, feel free to skip to the next section.

When not watching webinars this summer, I've been working on a prototype habitat model for the National Plan revision. The purpose of the original model in the 2013 Plan was to estimate the number of nesting habitat acres needed to produce a desired level of pheasant harvest in each state. If you haven't looked at the original model approach in a while, it would probably be a good idea to refresh your memory before moving on to the material below (in the National Plan, see pages 6-7 for an overview, and the individual states' model inputs and results starting on page 85).

Based on previous conversations about potential improvements to the model, the two most pressing needs are accounting for 1) non-random use of habitat types for nesting, and 2) declines in harvest that are linked to the loss of both hunters and habitat. I assumed that users wanted to retain the spreadsheet approach of the original model and proceeded accordingly.

The first issue can be addressed by incorporating a use/availability selection index for each habitat type into the model. I didn't think older studies conducted prior to the advent of modern CRP would be reliably applicable to selection in today's landscapes, so I compiled all the nest site selection observations I could find that were collected during the CRP era and extracted the proportional use and availability (at the study area scale, if possible) data from each. The habitat categories in the studies didn't perfectly align with those predominately used in the Plan (i.e., pasture, alfalfa, small grains, grass hay, and CRP) so I had to make some subjective interpretations to translate one to the other. **Pending review by the Technical Committee**, here are the preliminary results and how I propose using them to alter the model:

**Table 1.**

| | | Proportion of Nests | | | | |
|---|---|---|---|---|---|---|
| **Source** | **Nests** | **Pasture** | **Alfalfa** | **Sm Grains** | **Grass Hay** | **CRP** |
| Annis (2019) | 77 | 0.070 | | 0.239 | 0.014 | 0.676 |
| Clark et al. (1999) | 231 | 0.067 | | 0.014 | 0.013 | 0.906 |
| Geaumont et al. (2017) | 156 | 0.656 | | 0.000 | 0.078 | 0.266 |
| Matthews (2012) | 73 | 0.063 | | 0.000 | 0.006 | 0.931 |
| Pauly et al. (2018) | 116 | 0.139 | | 0.391 | 0.009 | 0.461 |
| **Average** | | **0.199** | | **0.129** | **0.024** | **0.684** |

It should be noted that some nests were found in habitat types that could not be reasonably assigned to the Plan categories (e.g., in row crops, cover crops, roadsides, etc.). Proportions of total nests in these "other" habitats ranged from zero in Pauly et al. to 0.355 (35.5%) in Clark et al., and averaged 0.109 (10.9%). These nests were excluded in the proportion calculations above, but the production from these "other" habitats can be accounted in later analyses, if desired.

**Table 2.**

| | | Proportion of Available Nesting Habitats | | | | |
|---|---|---|---|---|---|---|
| **Source** | **State** | **Pasture** | **Alfalfa** | **Sm Grains** | **Grass Hay** | **CRP** |
| Annis (2019) | KS | 0.178 | | 0.523 | 0.012 | 0.286 |
| Clark et al. (1999) | IA | 0.134 | | 0.029 | 0.026 | 0.812 |
| Geaumont et al. (2017) | ND | 0.573 | | 0.142 | 0.142 | 0.142 |
| Matthews (2012) | NE | 0.317 | | | 0.031 | 0.651 |
| Pauly et al. (2018) | SD | 0.373 | | 0.239 | 0.030 | 0.358 |
| **Average** | | **0.315** | | **0.187** | **0.048** | **0.450** |

The averages shown in Tables 1 and 2 are unweighted, but users can easily weight different studies depending on their perceived relevancy to the landscape they are applying to model to. None of the modern studies seemed to indicate alfalfa was used except perhaps incidentally, so I did not assign any use or availability values to it.

As in the original 2013 model, estimates of habitat-specific nest success are also needed to predict the proportions of birds produced in each habitat; those are below. The Kansas and North Dakota studies found no difference in success among habitats, so the study-wide rate is used for all habitats in those cases. The average shown is unweighted, but again users could weight them by study applicability if desired. All the studies except Geaumont et al. (2017) used radio-tagged hens to find their sample of nests, whereas Geaumont et al. used the chain-drag method to flush hens from nests within experimental habitat blocks, so users might also want to consider methodology when assigning weights. I included the success rates used in the 2013 model for comparison; you'll notice that the more recent rates vary from them somewhat, but nests in CRP still tend to be the most successful.

**Table 3.**

| Source | Study Years | Apparent Nest Success | | | | |
|---|---|---|---|---|---|---|
| | | **Pasture** | **Alfalfa** | **Sm Grains** | **Grass Hay** | **CRP** |
| Annis (2019) | 2017-18 | 0.270 | | 0.270 | 0.270 | 0.270 |
| Clark et al. (1999) | 1989-94 | 0.448 | | 0.448 | 0.448 | 0.623 |
| Geaumont et al. (2017) | 2006-11 | 0.400 | | 0.400 | 0.400 | 0.400 |
| Matthews (2012) | 2005-06 | 0.314 | | | 0.314 | 0.508 |
| Pauly et al. (2018) | 2011-12 | 0.148 | | 0.183 | 0.148 | 0.556 |
| **Average** | | **0.316** | | **0.325** | **0.316** | **0.471** |
| *(2013 Plan values)* | | *0.100* | *0.060* | *0.460* | *0.250* | *0.630* |

The relative productivity of each habitat across studies can then be derived by multiplying the habitat-specific selection index (i.e., Average P(Nests)/ Average P(Availability)) by its corresponding average nest success value. Dividing each of these resulting values by the value for CRP will then tell you how productive each habitat is relative to CRP on a per-unit basis, and the reciprocal of these ratios tells you how many acres of each habitat you need to equal the productivity of one acre of CRP.

**Table 4.**

| Estimate | Pasture | Alfalfa | Sm Grains | Grass Hay | CRP |
|---|---|---|---|---|---|
| Nest Site Selection (Avg P Use/Avg P Avail) | 0.632 | | 0.691 | 0.496 | 1.440 |
| Average Apparent Nest Success | 0.316 | | 0.325 | 0.316 | 0.471 |
| Relative Productivity (Selection*Success) | 0.200 | | 0.225 | 0.157 | 0.679 |
| Per-acre productivity relative to CRP | 0.294 | | 0.331 | 0.231 | 1.000 |
| CRP acre equivalent values | 3.401 | | 3.020 | 4.332 | 1.000 |

As in the 2013 model, when given some set of habitat acreages available in each category and an associated number of harvested birds, you can then estimate the number of harvested birds produced in each habitat. Applying the figures above to a hypothetical landscape with a total of 10,000 acres of nesting habitat of various types and a pheasant harvest of 4,500 birds:

**Table 5.**

| Estimate for Example Landscape | Pasture | Alfalfa | Sm Grains | Grass Hay | CRP | Sum |
|---|---|---|---|---|---|---|
| Relative Productivity (from Table 4) | 0.200 | | 0.225 | 0.157 | 0.679 | |
| Nesting Habitat Acres | 5,000 | | 3,000 | 1,000 | 1,000 | 10,000 |
| Proportion of Available Habitat | 0.500 | | 0.300 | 0.100 | 0.100 | 1.000 |
| Relative Production = Rel Productivity*Prop Avail Habitat | 0.100 | | 0.067 | 0.016 | 0.068 | 0.251 |
| Proportion of Production = Rel Prodtn/Sum of Rel Prodtn Values | 0.398 | | 0.269 | 0.062 | 0.271 | 1.000 |
| Harvested Birds Produced = Prop of Production*4,500 Tot Harv | 1,791 | | 1,210 | 281 | 1,218 | 4,500 |
| Acres Per Harvested Bird Produced | 2.8 | | 2.5 | 3.6 | 0.8 | |
| CRP Acre Equivalent Value (from Table 4) | 3.401 | | 3.020 | 4.332 | 1.000 | |
| CRP Acre Equivalents = Habitat Acres/CRP Ac Equiv Value | 1,470 | | 993 | 231 | 1,000 | 3,695 |

As you can see above, we can estimate that those 10,000 acres of total nesting habitat are equivalent in production value to about 3,700 acres of CRP. This could be a potentially useful way of characterizing both the quantity and quality of a landscape's nesting habitat in a single index, and I'll use this metric later.

But first, your eyes are probably glazed over after staring at all those numbers, so here are some pheasant chicks to rest them on. Aren't they cute!

Okay, so that's my preliminary way of dealing with issue number one. Issue number two is how to relate a state's acres of habitat to its pheasant abundance, hunter numbers, and harvest using inputs that are relatively unaffected by a trend in hunters. To do this, I propose breaking the process down into three steps: 1) estimate the relationship between a state's habitat acres and some annual index of abundance (not the statewide harvest estimate, but rather harvest per hunter-day, harvest per hunter per season, a summer brood count index, North American Breeding Bird Survey index, etc.); 2) estimate the relationship between the abundance index and statewide hunter numbers; and 3) estimate the relationship between hunter numbers and total harvest. From both policy and R3 perspectives we are much more interested in hunter participation as a key outcome than total harvest, so step three is optional.

Step one starts with extracting data from the USDA Quick Stats website to find the number of acres of Plan habitat types present within a state's pheasant range. This sounds straightforward but in fact requires several subjective judgement calls to end up with reasonable estimates of available habitat.

Let's use Nebraska as an example. Pheasants inhabit all its counties, so we can use the annual statewide habitat acreage figures (1990-present) for CRP, small grains (wheat, oats, rye, barley, and flax combined), and grass hay (i.e., total hay excluding alfalfa) from the USDA as a starting point. Pasture acres are only estimated every five years, so I used linear extrapolation to fill in the blanks between estimates – this is the first subjective call. Next, knowing that there are large chunks of Nebraska where pheasants are absent or nearly so, I subjectively estimated the proportion of the statewide acres in each habitat type I thought were likely to be actually available to the pheasant population (1.00, 0.75, 0.60, and 0.15 for CRP, small grains, grass hay, and pasture, respectively). There may be some GIS-based approaches that would yield more rigorous estimates, but if not we might have to rely on the state's expert opinion (aka "guessing") for this. Given that I was unable to reproduce some of the states' available acreage estimates listed in the 2013 Plan from the currently available USDA Quick Stats data, I believe a number of states probably made these ad hoc adjustments to their base USDA data in the original National Plan model, as well.

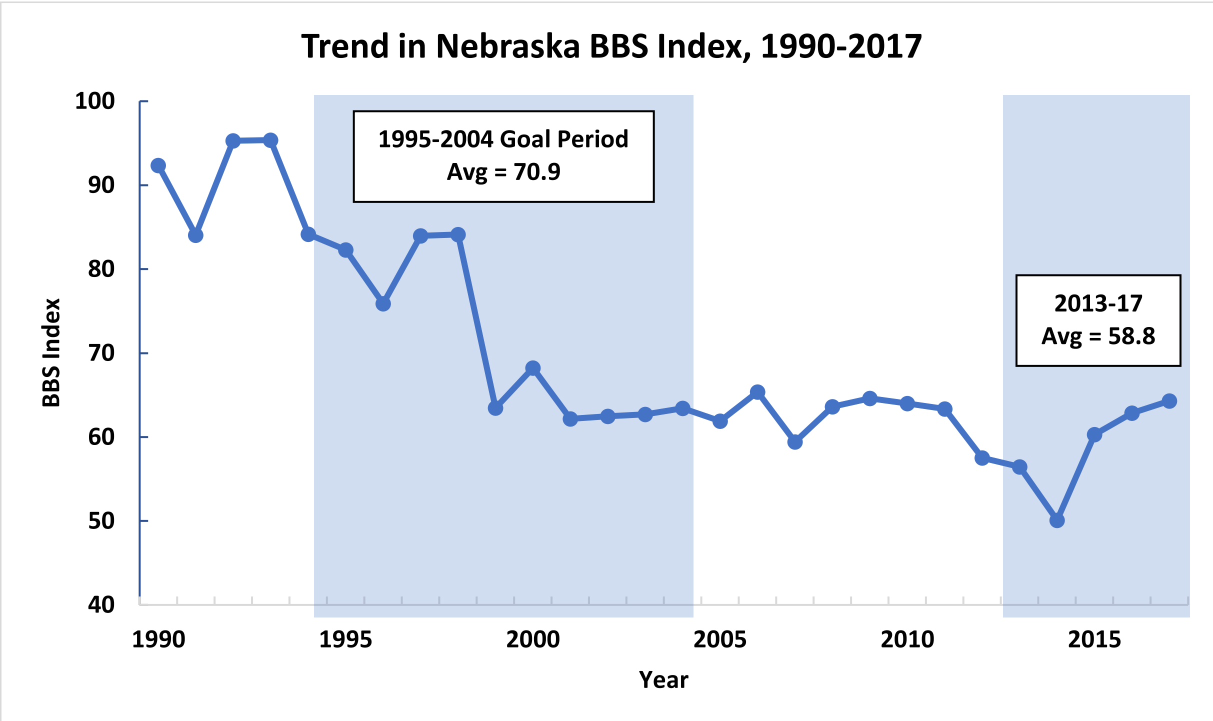
So that said, below are my estimates of available habitat acres for Nebraska from 2013 to 2017. (These are just for demonstration purposes; John Laux can and should come up with actual estimates for Nebraska when the time comes to do this for real.) The data set relevant to the Plan goes back to 1990, so only a subset is displayed here. The CRP Acre Equivalents are calculated the same as in the last line of Table 5.

**Table 6.**

| | Modified USDA Acreage Estimates for Nebraska | | | | |
|---|---|---|---|---|---|
| **Year** | **Pasture (15% of total)** | **Small Grains (75% of total)** | **Grass Hay (60% of total)** | **CRP (100% of total)** | **CRP Acre Equivalents** |
| 2013 | 3,321,646 | 1,215,000 | 1,080,000 | 887,448 | 2,515,882 |
| 2014 | 3,298,679 | 1,245,000 | 1,050,000 | 843,701 | 2,468,390 |
| 2015 | 3,275,712 | 1,218,750 | 1,110,000 | 785,186 | 2,408,280 |
| 2016 | 3,252,745 | 1,128,750 | 1,020,000 | 781,979 | 2,347,741 |
| 2017 | 3,229,778 | 922,500 | 1,080,000 | 800,378 | 2,304,944 |

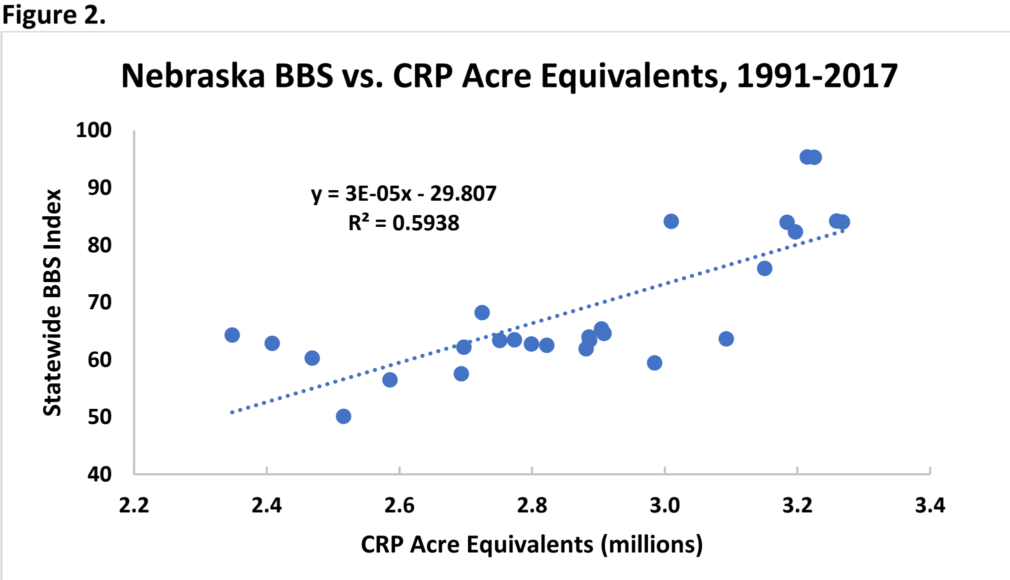
I used Nebraska's statewide BBS index as my measure of abundance for this example. For a population goal, I used the average index value during 1995-2004 (the reference period Nebraska chose in the original Plan) and compared it with the most recent 5-year average.

**Figure 1.**




The difference between the recent 5-year average index and the goal is 12.1 BBS units. Before proceeding we can check and make sure there is a relationship between our measures of pheasant and habitat abundance, and indeed it appears there is.

**Figure 2.**

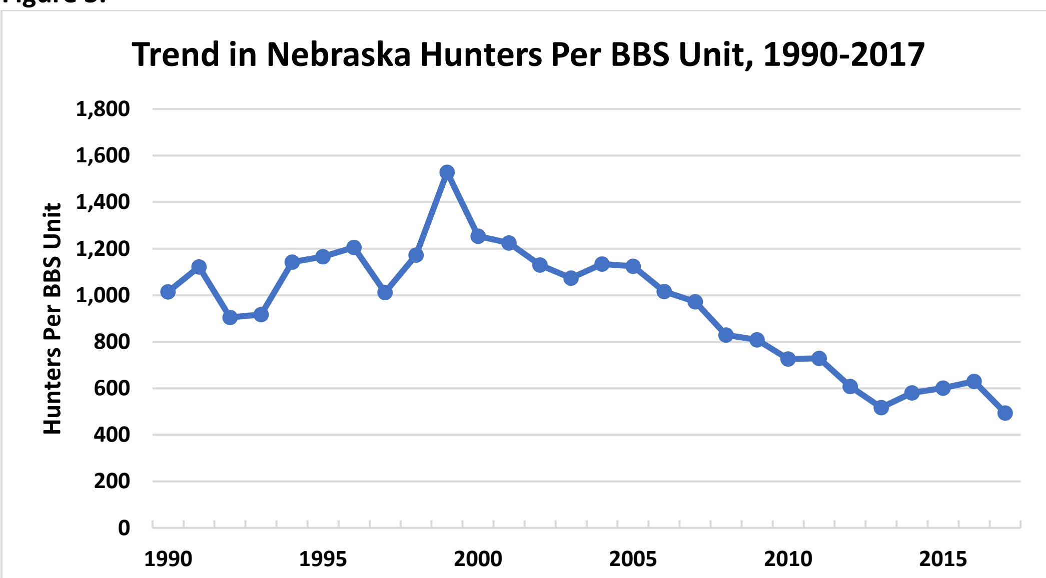


There are several ways of estimating how many CRP acre equivalents we need to increase our BBS index by 12.1 units. The easiest would just be to assume we'd get there by returning to the same average habitat values that existed during the 1995-2004 reference period, which was about 2.89 million CRP acre equivalents. The recent 5-year average is about 2.41 million, so we need an additional 0.48 million habitat units to reach our abundance goal.

Another approach would be to use the linear equation in Figure 2 to make the estimate. Using the equation to solve for our average reference and recent abundance levels (70.9 and 58.8) yields an estimated 2.93 million habitat units during the reference period and 2.58 million recently, for a difference of 0.35 million CRP acre equivalents. Deciding which of the two (or more) methods yields the more realistic and preferable estimate is up for discussion.

Determining the relationship between pheasant abundance and hunter participation is more problematic because recent changes in hunter demographics probably make it unstable. Evidence for this can be found by looking at the change in the ratio of abundance to participation over time.

**Figure 3.**




In this case, we might use the recent (2013-17) average in the hunters-per-BBS-unit ratio (564) and multiply it by the additional BBS units (12.1) we need to achieve our abundance goal to estimate the number of hunters we would gain at the goal level (i.e., 564 x 12.1 = 6,824 additional hunters). The average number of pheasants harvested per hunter during the 1995-2004 reference period was 5.67, so these additional hunters might add an estimated 6,824 x 5.67 = 38,692 birds to the harvest at our goal abundance level.

So those are some initial ideas. As with the 2013 Plan model, this approach will no doubt work better for some states than others, so we will need to build in plenty of flexibility to accommodate a range of situations. It would certainly be easier to go over this at an in-person Technical Committee meeting, but that won't be an option for a while. I'll try to set up a Teams call with the Committee soon to start the conversation. In the meantime if you have any comments or alternative approach ideas, please send them my way.

Literature Cited

Annis, A. C. 2019. Ring-necked pheasant survival, nest habitat use, and predator occupancy in Kansas spring cover crops. Thesis. Kansas State University, Manhattan. 129pp.

Clark, W. R., and T. R. Bogenschutz. 1999. Grassland habitat and reproductive success of ring-necked pheasants in northern Iowa. Journal of Field Ornithology 70:380-392.

Geaumont, B. A., K. K. Sedivec, and C. S. Schauer. 2017. Ring-necked pheasant use of post-Conservation Reserve Program lands. Rangeland Ecology and Management 70:569-575.

Matthews, T. W. 2009. Productivity and habitat selection of ring-necked pheasants and greater prairie-chickens in Nebraska. Thesis. University of Nebraska-Lincoln. 136pp.

Pauly, B. J., T. J. Runia, A. J. Solem, C. D. Dieter, and K. C. Jensen. 2018. Ring-necked pheasant nest success and habitat selection in central South Dakota. Great Plains Research 28:39-50.

## Pheasant-relevant Media

Iowa DNR conducts pheasant population survey
Iowa's 2020 pheasant nesting outlook positive after mild winter
Iowa pheasant, quail, rabbit, dove and partridge harvests all down in 2019
North Dakota pheasant brood counts up at survey midpoint
Michigan pheasant hunting reserve grateful for extended season following COVID shutdown

And other news containing the word "pheasant," in case you missed it…
Dr. Pheasant dies
Two Midget golfers set personal bests
Golden State Killer ostensibly a pheasant hunter, but now wife not so sure

## Recent Literature

Sundall, M. 2020. The effect of the neonicotinoid Clothianidin on ring-necked pheasant survival and reproduction. Thesis. South Dakota State University, Brookings.

Godar, A. J. 2020. Ring-necked pheasant population and space use response to landscapes including spring cover crops. Dissertation. Kansas State University, Manhattan.

Hall, A. D. W. 2020. Improving sustainability and monitoring within the UK pheasant release system. Dissertation. University of Exeter, United Kingdom.

Fulton, R. M., and R. M. Fulton. 2020. Common diseases of Michigan gamebirds: a retrospective study. Avian Diseases (early view).

Morrow, M. E. and J. E. Toepfer. 2020. Use of predator-deterrent fences to increase Attwater's prairie-chicken nest success. Journal of Fish and Wildlife Management (early view).

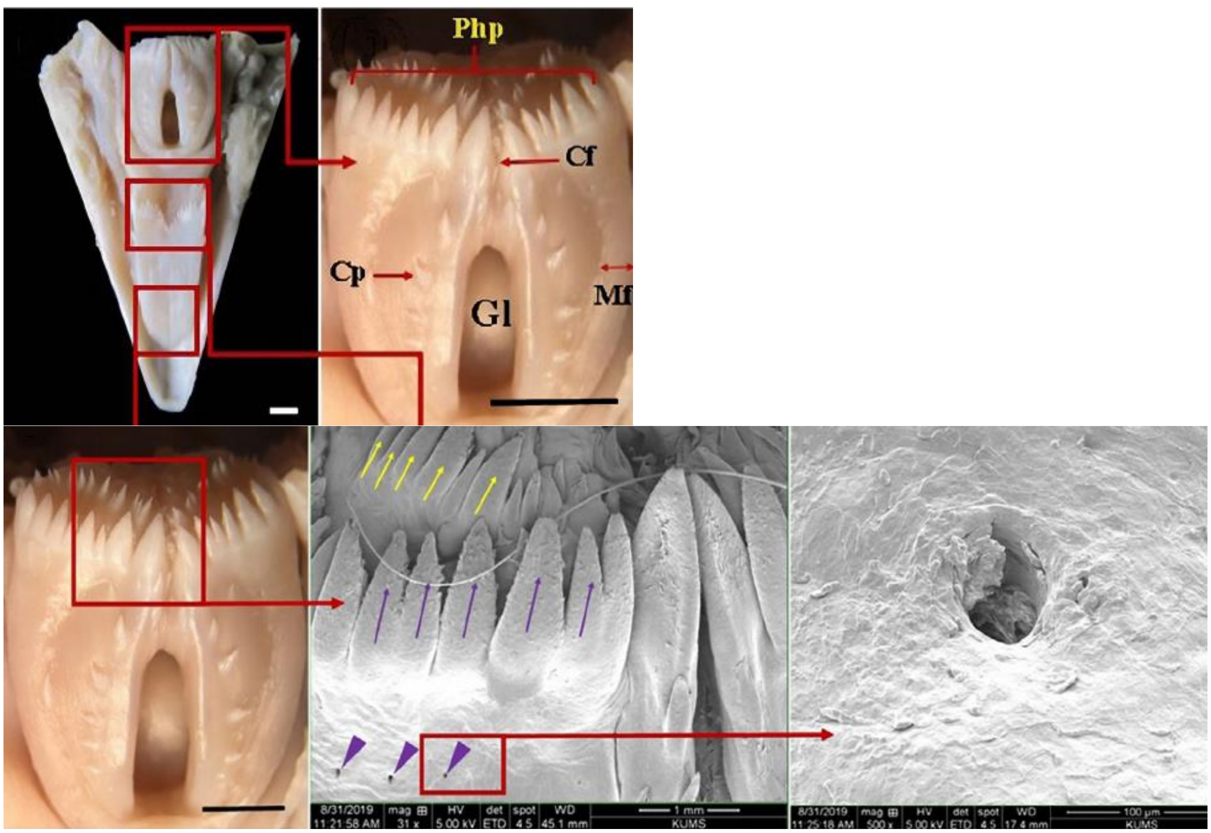
von Essen, E., and M. Allen. 2020. Killing with kindness: when hunters want to let you know they care. Human Dimensions of Wildlife (early view).

[Aguilera, G., T. Roslin, K. Miller, G. Tamburini, K. Birkhofer, B. Caballero-Lopez, S. A. Lindstrom, E. Ockinger, M. Rundlof, A. Rusch, H. G. Smith, and R. Bommarco. 2020. Crop diversity benefits carabid and pollinator communities with semi-natural habitats. Journal of Applied Ecology (early view).]

**Trivia Answer**

It's the set of structures associated with a pheasant's laryngeal entrance at the back of the tongue. Just in case you were wondering what they looked like. If you remember from ornithology class, air flows through this opening into the lungs and food passes back beyond the tongue into the esophagus, allowing birds to swallow food and breathe at the same time.

Photos are from Elyasi and Goodarzi (2020), and the labeled structures are the conical papillae (Php and Cp), glottis (Gl), caudal fissure (Cf), and mucosal fold (Mf). The small pore in the lower right is the opening of a salivary gland.




*This update is brought to you by the National Wild Pheasant Conservation Plan and Partnerships. Our mission is to foster science-based, socially-supported policies and programs that enhance wild pheasant populations, provide recreational opportunities to pheasant hunters, and support the economics and social values of communities. You can find us on the web at http://nationalpheasantplan.org.*