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Pest & Crop Newsletter

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PURDUE UNIVERSITY | Extension - Entomology

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In This Issue

Storms From The Southwest Are Depositing Black Cutworm Moths

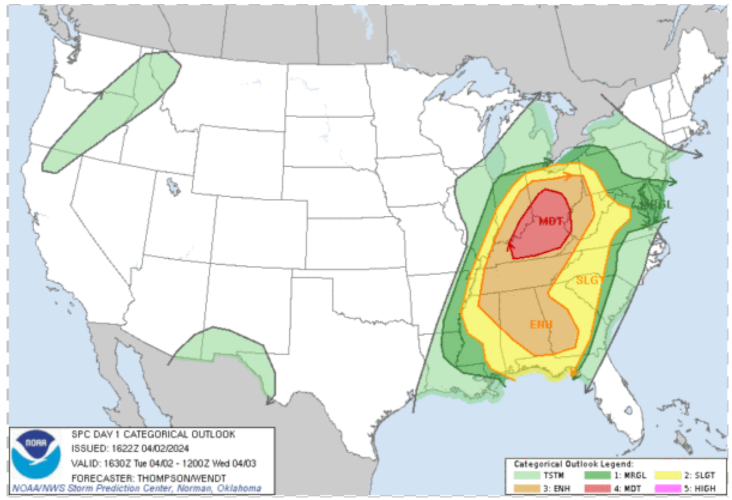
(Christian Krupke) & *(John Obermeyer)*

For the last couple of weeks, storms originating in the Southwestern U.S. have effectively "vacuumed up" black cutworm (BCW) moths and deposited them, along with rainfall, in the Midwest. The first recorded moth capture was March 20, but many followed with subsequent storm fronts. This is an annual event, although the timing varies. We replenish our BCW numbers annually; they cannot overwinter in Indiana and are not cold hardy.

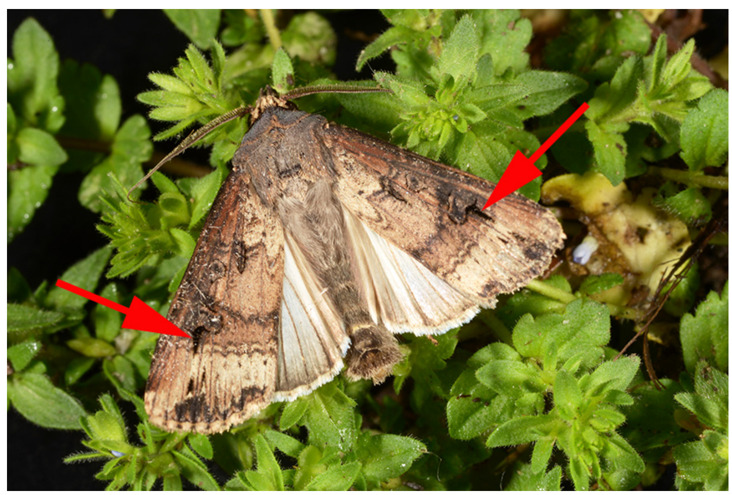
Often, we will receive freezing temperatures following these early spring flushes. Many BCW that have arrived in mid or late March often likely perish during these cold spells. But they will keep filtering in over the coming weeks, and there are certain to be sufficient moths to lay eggs in the many winter-annual weeds (particularly broad-leaf weeds, chickweed is a favorite) and broad-leaved cover crops.

In the near future, we will publish color-coded maps with BCW anticipated development to help you time your scouting trips. As a reminder, the cutworm threat will be greatest when there is a "green bridge" for them – shifting from weeds and/or cover crops to seedling corn as it emerges. We recognize that this is often (usually) unavoidable, but still worth mentioning. BCW larvae cannot go long without feeding, so a period with no host plant material will often mean death by starvation.

The following NOAA outlook map, issued on April 2, 2024, graphically shows the origins in the Gulf States and fanning out through the Midwest:



NOAA Outlook map issues on April 2 2024



Black "daggers" used for identification of the black cutworm moth. (*Photo Credit: John Obermeyer*)

Alfalfa Weevil Damage Likely Started In Southern Indiana

(Christian Krupke) & *(John Obermeyer)*

Pest managers in southern Indiana should now be scouting their alfalfa for leaf feeding from weevil larva. Higher risk fields are those that have been in alfalfa for over three years. The most vulnerable areas of the field are south-facing slopes that heat up earliest in the season. This pest is often overlooked during the busy spring season, but it is worth checking in on high risk fields. Timely insecticide treatment is highly effective. More on this pest, damage, and management guidelines can be found by clicking HERE. Recommended insecticides can be found HERE.

Following a hard freeze, these alfalfa weevil larvae were quite healthy and feeding away in the tip. (*Photo Credit: John Obermeyer*)

Armyworm Pheromone Trap Report – 2024

(John Obermeyer)

County/Cooperator	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8	Wk 9	Wk 10	Wk 11
Dubois/SIPAC Ag Center	0										
Jennings/SEPAC Ag Center	1										
Knox/SWPAC Ag Center	0										
LaPorte/Pinney Ag Center	0										
Lawrence/Feldun Ag Center	4										
Randolph/DPAC Ag Center	0										
Tippecanoe/ACRE	0										
Whitley/NEPAC Ag Center	0										

Wk 1 = 4/1-4/3/24; Wk 2 = 4/4-4/10/24; Wk 3 = 4/11-4/17/24; Wk 4 = 4/18-4/24/24; Wk 5 = 4/25-5/1/24; Wk 6 = 5/2-5/8/24; Wk 7 = 5/9-5/15/24; Wk 8 = 5/16-5/22/24; Wk 9 = 5/23-5/29/24; Wk 10 = 5/30-6/5/24; Wk 11 = 6/6-6/12/24

Grain Yield Trend Lines: Don't Be Fooled

(Bob Nielsen)

- Historical yield trends offer a glimpse into the future.
- Yield trend lines are simple to calculate.
- Be aware that trend lines based on short-term data can be misleading.

Historical trends in grain yield and the prospect of using them to predict future grain yields are of interest to a wide range of folks involved with row crop agriculture, from farmers to global grain marketing specialists. Personally, I have always been mesmerized by the historical changes in national corn grain yield that USDA first began to publish in 1866 (Nielsen, 2023).

Changes in grain yield over time tend to be linear in nature, with the occasional change in the slope or rate of linear increase in response to changes in genetics or other agricultural technologies. Consequently, "trend lines" tend to be calculated using simple linear regression methodologies with widely available spreadsheet software like Microsoft Excel.

For example, the linear trend for corn grain yield improvement in the U.S. since 1956 has been 1.9 bu/ac/yr (Fig. 1, blue trend line). That trend line calculation accounts for 94% of the historical year-to-year variability in grain yields. In other words, that trend line is a very good "fit" to the data.

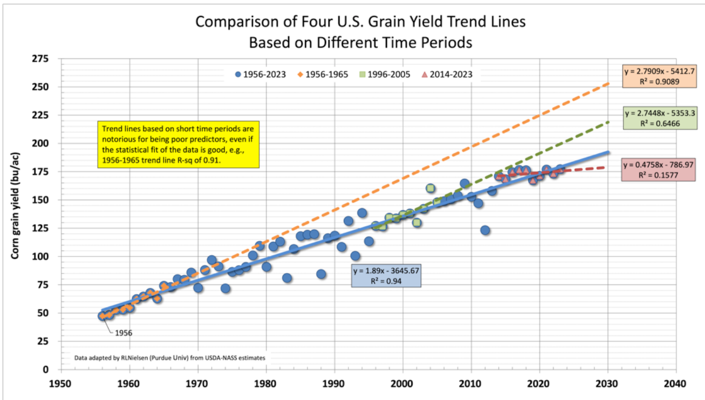
As with any use of statistics, there are certain precautions one should take to minimize the risk of drawing incorrect conclusions. One such precaution relative to grain yield trends is understanding the impact of the length of the time period used in estimating the yield trend line. Irwin and Hubbs (2020) addressed this issue from a somewhat different perspective. I want to illustrate the need for precautions using a few simple examples.

The 10-year period beginning with the 1956 U.S. corn crop was one in which grain yield increased over time fairly consistently. The linear yield trend calculated for that 10-year time period was a very good "fit" to the data (R^2 = 0.91) and indicated that grain yield had increased at a rate of 2.8 bu/ac/yr (Fig. 1, orange trend line). There were undoubtedly agricultural "experts" in the spring of 1966 who confidently predicted that by the year 2030 the average U.S. national corn grain yield would be close to 250 bu/ac. History ultimately showed that those "experts" were wrong (Fig. 1). The growing conditions of the 10-year period 1956-1965 just happened to favor high grain yields.

The advent of hybrid corn with transgenic traits (so-called GMO or biotech hybrids) in the mid-1990s was loudly hailed as the precursor of the third "miracle" of corn yield improvement (e.g., Schill, 2007). Such proclamations were based, in part, on the simple belief in the power of biotechnology. Others later pointed to the 10-year trend line beginning in 1996 that seemingly showed that the historical trend in corn yield improvement (beginning in the mid-1950s) of 1.9 bu/ac/yr had, in fact, "miraculously" increased to 2.7 bu/ac/yr (Fig. 1, green trend line). That apparent increase in the linear rate of corn yield improvement predicted the average national corn grain yield by 2030 would be about 220 bu/ac.

(See my earlier article that references the previous historical "miracles" of corn yield improvement)

More recently, an article was published in the Agricultural & Applied Economics Association's Choices magazine (Boussios, 2024) which argues that the most recent 10 years of U.S. corn grain yield estimates from USDA indicate that U.S. corn productivity is beginning to slow down. While it is true that the trend line for U.S. grain yield for the past 10 years (2014-2023, Fig. 1, red trend line) describes a much lower annual rate of yield gain than the longer term trend line (Fig. 1, blue trend line) , I believe history shows that such short term trend lines do not necessarily predict future yields reliably.



Comparison of 4 U.S. grain yield trend lines based on 4 different time periods. Data adapted from USDA-NASS.

CLOSE ✕

Figure 1. Comparison of Four U.S. Grain Yield Trend Lines Based On Different Time Periods

I argue that there is no assurance that the trend line using the past 10 years (2014-2023) is any more predictive of future yields in 2030 than the one based on the earlier 10-year period (1956-1965). The trend line based on the past 68 years of historical yields has, to date, been a reliable predictor of future yield, interrupted by a number of years with unusually extreme growing conditions, and probably has a greater probability of being "in the ballpark" in the near future than any trend line based on much shorter time periods.

That's my opinion and you are entitled to it.

References and related reading

Boussios, David. 2024. A Slowdown in U.S. Crop Yield Growth. Choices, a publication of the Agricultural & Applied Economics Association. https://www.choicesmagazine.org/choices-magazine/submitted-articles/a-slowdown-in-us-crop-yield-growth [accessed Mar 2024].

Irwin, Scott and Todd Hubbs. 2020. "How Sensitive Are Trend Yield Projections for U.S. Corn to the Starting Year of the Estimation Period?"" farmdoc daily (10): 107, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign. https://farmdocdaily.illinois.edu/2020/06/how-sensitive-are-trend-yield-projections-for-us-corn-to-the-starting-year-of-the-estimation-period.html [accessed Mar 2024].

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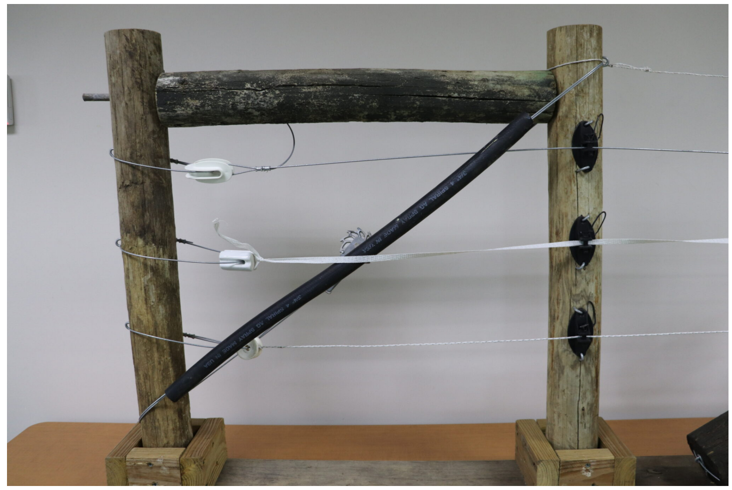
Schill, Susanne Retka. 2007. "300-Bushel Corn is Coming." Ethanol Producer Magazine. BBI International. http://www.ethanolproducer.com/articles/3330/300-bushel-corn-is-coming/ [accessed Mar 2024].

Determining Fencing Needs

(Keith Johnson) & *(Jason Tower, Superintendent, Southern IN Purdue Agricultural Center)*

A planned fencing system is critical to an effective pasture system. The following article prepared by Jason Tower, Superintendent of the Southern Indiana Purdue Agricultural Center, is from the 2023 Heart of America Grazing Conference Proceedings. The article is used with permission from Jason Tower. Jason was a guest speaker about fencing and water systems to 51 students that are enrolled in the Purdue University Forage Management class on April 3.



The fencing exhibit is one of a kind that was developed by Jason Tower for use when showing various electric fencing options. The display is part of his fencing presentation. (*Photo Credit: Keith Johnson*)

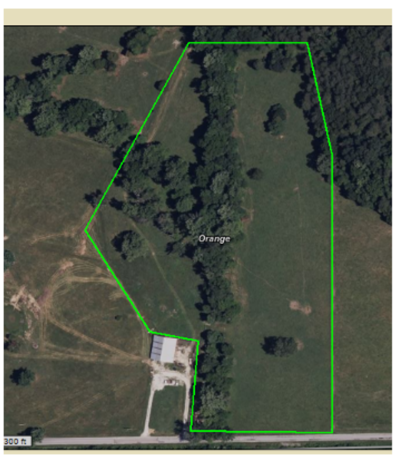
Jason Tower discusses different water float options with the Purdue University forage management class. (*Photo Credit: Keith Johnson*)

Evaluating need and resources are important steps in any project and developing a fencing system for livestock is no different. Each operation is going to have special requirements for fence depending on the topography of the land, the species and class of livestock in the operation, and the goals and intensity of the grazing program. Depending on how one evaluates the needs, this will determine the fencing system required. In the information that follows, there will be a series of thoughts and points of discussion to aid in the planning process. At the end of the article is a listing of online resources for greater detail on many of the points discussed.

If the fence is on a property line it might be considered a "partition fence" and would be required to be built to the standards specified in the state fence law. Each state might be different in this regard and state statute should be investigated. The state fence law can also specify which party is required to build which section of fence.

Once it is determined the type of fence that is required, either property line fence or interior fence, the planning process can begin. Technology exists to get good overhead views of the land to help determine locations of the fence. This technology might be an unmanned arial vehicle (UAV) with a camera or an online resource utilizing satellite imagery. With these photographic results downloaded onto a computer, it is now possible to get measurements for length of fence, estimate the locations and quantity needed for corner brace systems, and the exact locations of the fence based on property lines, shade locations, gate locations, and water locations among other factors. A producer can then take these maps to the pasture and physically look at and walk the areas to be fenced to ensure it makes sense on the ground. What made sense in the photo might not in person. As the manger thinks about the flow of livestock or sees a physical characteristic of the land that would change where a fence should be located, those adjustments can then be noted on the planning map before the building process is initiated.

Building fence to maintain livestock on the property, or off the property depending on the situation, would be determined by livestock species and class within the species. Fencing requirements for cow-calf pairs is much less substantial than would be required for does and their kids. For example, a 2-or-3-wire properly spaced electrified hi-tensile wire would be adequate for the cattle operation but for the goat operation, more than likely, this fence would not contain the animals. It would need to be 6 or 8 properly spaced electrified hi-tensile wires, or even a woven wire fence.



Measure

Segment	Distance (Feet/Miles)	Distance (Meters/Kilometers)
Segment 1	730 feet	222 meters
Segment 2	303 feet	93 meters
Segment 3	312 feet	95 meters
Segment 4	565 feet	172 meters
Segment 5	318 feet	97 meters
Segment 6	130 feet	40 meters
Segment 7	237 feet	72 meters
Segment 8	372 feet	113 meters
Total Distance	2,971 feet	905 meters

Screen shot from the Web Soil Survey

In planning a fencing system, maintaining flexibility in the interior fence should be a high priority. If a producer is involved in a cost share program (NRCS program EQIP) there might be requirements that interior fence be a permanent installation and be built to the required specifications. If the land is new to the operator and they have not managed livestock there before, it makes sense to be flexible and temporary with the interior fence. It takes a few grazing seasons to get a feel for the land and how livestock use different areas or how they might need to flow to get to handling facilities or watering locations. One can waste a great deal of time and effort building interior fence to only find out much of it was placed in the wrong location.

A grazier also needs to think about what type of agriculture equipment might be utilized in the operation. Will large fertilizer and spray rigs be used? Will hay production occur on some paddocks? Might multiple species of livestock be grazed? In answering these questions, location and gate size can be determined. How small permanent interior pasture divisions are made could also be a factor in deciding the fence type needed.

If electric fence is desired, is there a 120-volt power source on the property or will a solar powered system be required? Both systems can be designed to match the needs of the livestock and the length of fence. The longer the length of fence the more joule output is needed from the energizer. Also grazing small ruminant livestock will take a higher output energizer than cattle as greater voltage is needed to keep them in the proper location. Once the size and location of the energizer is determined, installing a proper grounding system is critical to the success of the system. If the electric fence system is not adequately grounded, the animals will not receive a shock strong enough to deter them from, crossing the fence regardless of the amount of voltage on the fence. Follow the manufacturer's recommendation for ground rod installation and then test the system to be sure it meets the requirements Remember, an electric fence system is a **psychological** barrier, not a **physical** barrier to the animals. The animal's initial interaction with the fence needs to be a memorable one.

Having electric fence available on the entire property greatly increases the flexibility of the types and locations of temporary fence that can be utilized. With electric fencing, producers have the ability to use step-in posts and poly wire (or electrified poly netting) to control the grazing movement of the livestock. This type of fence is very economical to purchase and is very time efficient to move on a regular basis to keep animals grazing a high quality and quantity diet and allows for proper recovery of the forages prior to the next grazing event.

Answering the question of "What type of fence do I need?" is not simple or short. Each farm and situation are unique and will require a tailored fence system. Taking time to think about and plan what the grazing system might be will aid greatly in getting the proper fence installed on the first attempt.

As The Sayings Go…

(Beth Hall)

An old saying predicts that March will go out "like a lamb". Another saying predicts April's wetness with "April showers bring May flowers". A lot seems to have happened across Indiana since April began, but March finished the month with below-normal rainfall (except for the northern counties) and above-normal temperatures. Does this describe conditions that are "like a lamb"? I'll let 'ewe' decide!

And then came April. We are less than a week in and already some parts of Indiana have received more than 750% of what is normal for early April. That is not a typo! Actual amounts have ranged from just below an inch of water in southwest and far southeast Indiana along the Ohio River to over three inches around the eastern counties of Adams and Jay (Figure 1). Typical rainfall for the entire month of April (averaged from 1991-2020) ranges from just 0.2" to less than 0.75". Can we really call what we've seen in just the first few days April "showers"? Streams are flooding across the state, soil moisture percentages have increase significantly, and many are hoping for just a few dry days for things calm down a bit. The U.S. Drought Monitor has eliminated abnormally dry conditions across most of the state except for southwestern counties. The far southwestern counties are considered in Moderate Drought (Figure 2). And then there are the temperatures. True, April is part of the transitional season where one day the temperature can be in the 70s and the next is a chilly 30s with light snow falling. Much of Indiana was already seeing some snow flurry activity on April 3rd after the heavy rainfall events passed through. Will that be the last of our snow events for the season, or can we expect a few more? The Midwestern Regional Climate Center has a Snowfall Climatology Toolbox (https://mrcc.purdue.edu/resources/climateTools/snowfallclimatology) where users can look up the last date of measurable snowfall for a nearby station. According to this product, since 1991, the average last date of snowfall measuring at least 0.1 inches has occurred sometime in March (with a few stations far north indicating April 1st or April 3rd). However, the latest dates have occurred in late April to mid-May. Will 2024 set a new 'last date of measurable snowfall' record since 1991?

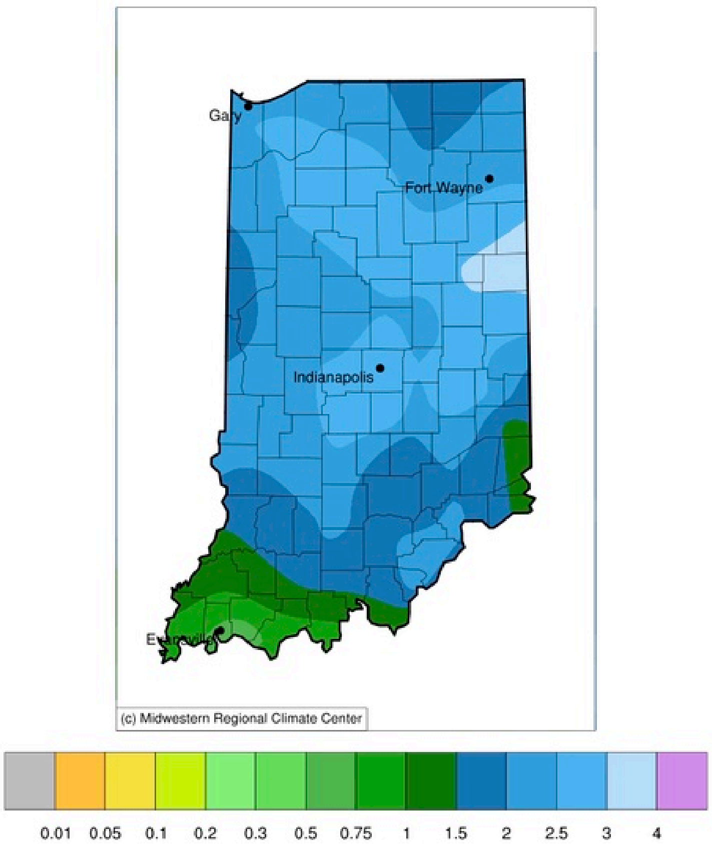


Figure 1. Total precipitation from April 1-4, 2024.

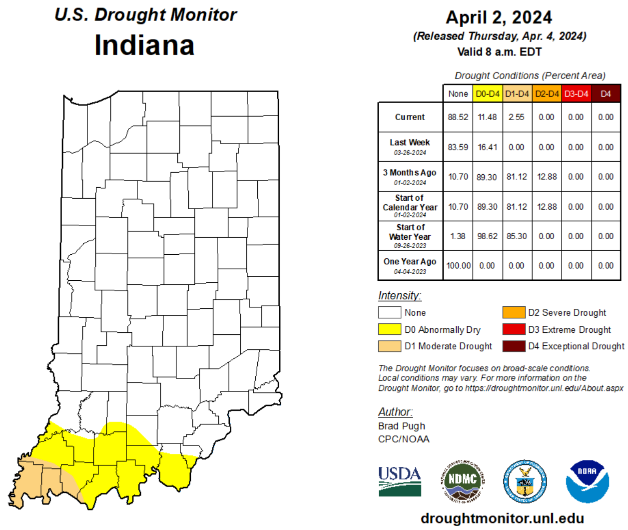


Figure 2. U.S. Drought Monitor reflecting conditions through April 2, 2024.

According to the national Climate Prediction Center, climate outlooks over the next two weeks are favoring above-normal temperatures with the next 6-10 days favoring above-normal precipitation while the 8-14-day outlook is favoring near-normal precipitation (Figure 3). Hopefully, this means very little chance of measurable snowfall over the next few weeks. The monthly climate outlook for April continues to support those trends with the highest probability of above-normal precipitation occurring across central Indiana. Please keep in mind, though, that short-term freeze events can still move through fast enough that climate models are unlikely to predict them. Similar to the MRCC's Snowfall Climatology Toolbox, the MRCC has another tool, the Freeze Date Tool (https://mrcc.purdue.edu/freeze/freezedatetool), where users can select a temperature threshold and statistical value (e.g., earliest, average, latest) for the date when the last spring freeze occurred since 1950. For example, across much of Indiana (except for southwestern counties), the latest date of a 28-degree freeze occurred on May 9th (the "Mother's Day Freeze Event of 2020").

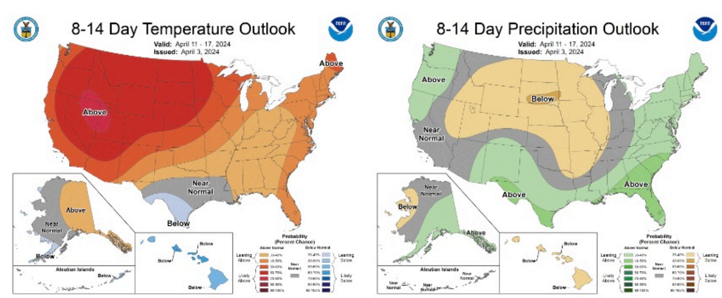


Figure 3. The 8-14 climate outlooks for April 11-17 for temperature (left) and precipitation (right). Note that shading indicates the probability of above-, near-, or below-normal conditions occurring and not necessary the magnitude of that departure from normal.

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