

Hemp and Hop Outlook

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PennState
College of Agricultural Sciences



PennState Extension

2018 Farm Bill

- Removes industrial hemp from Schedule I narcotics list
- Industrial hemp now becomes federally legal to grow and possess
- Each state can and will impose their own regulations and policy!



Timeline

2005: [H.R.3037](#): First legislation introduced since the ban on hemp to seek to remove restrictions placed on non-psychoactive industrial hemp. It defined industrial hemp, excluded it from the definition of marijuana, and assigned authority to regulate it to each individual state. (Bill failed.)

2007: [H.R.1009](#): Same as above. (Bill died in committee.)

2009: [H.R.1866](#): Same as above. (Bill died in committee.)

2011: [H.R.1831](#): Same as above. (Bill died in committee.)

2012: [S.AMDT.2220](#): Introduced as an industrial hemp amendment to the Farm Bill. (Failed to be attached to bill.)

2012: [S.3501](#): First hemp bill to be introduced in the Senate since the 1950s. (Bill failed.)

2013: [H.R.525](#): (Bill failed.)

2013: [S.AMDT.952](#): Amendment to 2013 Farm Bill. (Amendment not given a floor vote.)

2013: [H.AMDT.203](#): Allowed for educational institutions to cultivate hemp for research purposes. First hemp legislation passed since the 1950s. (Amendment passed.)

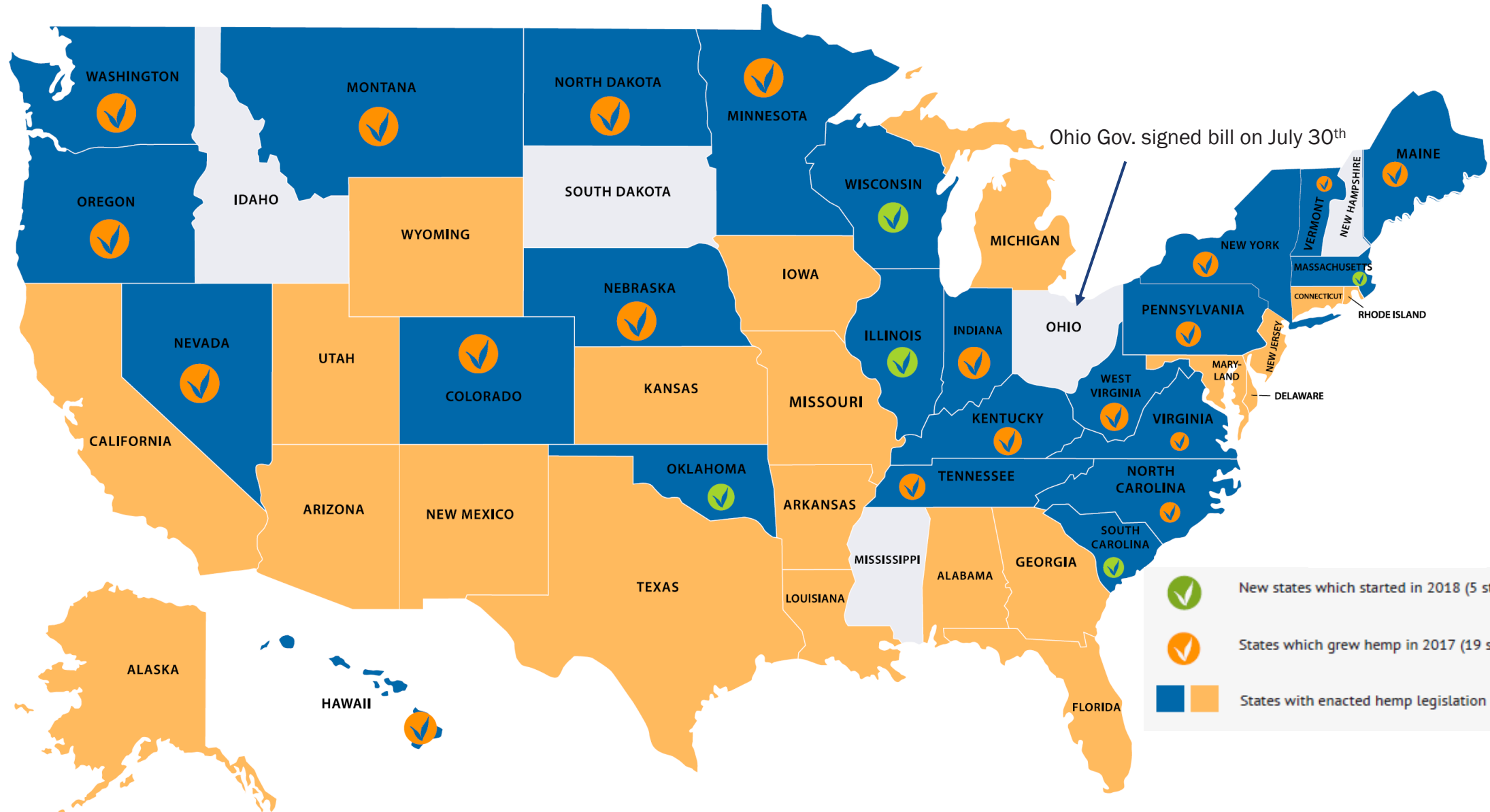
2014: [Farm Bill of 2013](#) signed into law. The bill defines industrial hemp, authorizes higher education institutions to grow hemp for research purposes. However, these institutions are still subject to the laws and regulations of the state they are based in.

2015: [S.134](#): (Bill failed.)

2015: [H.R.525](#): (Bill failed.)

2017: [H.R. 3530](#): Bill included provisions for allowing Native American tribes to grow hemp and for allowing the cultivation of hemp with a THC concentration up to 0.6% for research purposes.

2018: [S.2667](#) & [H.R.5485](#): Hemp Farming Act included in 2018 Farm Bill. (Bill passed and signed into law.)



	2017 Acres	2018 Acres	2019 Acres
Montana	542	22,000	
Colorado	9,700	21,578	80,000
Oregon	3,469	7,808	51,000
Kentucky	3,271	6,700	50,000+
Tennessee	200	3,338	
North Carolina	965	3,184	7,922
North Dakota	3,020	2,778	
New York	2,000	2,240	
Nevada	417	1,881	
Wisconsin	N/A	1,850	
Vermont	575	1,820	2,711
Minnesota	1,205	710	
Pennsylvania	36	580	600+
Maine	30	550	
Oklahoma	N/A	445	
South Carolina	N/A	256	
West Virginia	14	155	
Washington	175	142	
Virginia	87	135	
Massachusetts	N/A	21	
Indiana	5	5	
Hawaii	1	2	
Nebraska	1	1	
Illinois	N/A	0	
Total	25,713	78,176	

Source: Vote Hemp

Source: Hemp Industry Daily

The Three Market Classes

- **Fiber (ag)**
- **Grain (ag)**
- **CBD (hort)**



Hemp Uses

- Fiber
 - “Bast” or Bark, Inner core or “Hurd”
 - Textiles, building material, animal bedding
- Seed
 - Pressed oil
 - Hemp Hearts
 - Hempseed meal
- Pharmaceuticals
 - Cannabidiol (CBDs) (Low THC)
 - Medical marijuana (CBD+THC)
 - Recreational marijuana (High THC)



2017 Seed Harvest, Rock Springs, PA

	Fiber	Grain	CBD
<i>Equipment</i>	Drill, discbine or sickle bar, baler	Drill, combine	Tillage, plastic bed layer, transplanter, drip irrigation
<i>Acreage</i>	Large field	Large field	Small field, greenhouse, high tunnel
<i>Planting timing</i>	Direct seed after risk of frost	Direct seed after risk of frost	Transplant after risk of frost
<i>Harvest timing</i>	August-September, pre seed set	September-October, post seed set	Bud to flower
<i>Harvest approach</i>	Whole plant. Hay-type equipment	Seed head only. Combine reel head, set high	Whole plant. Hand-cutting, hanging. Specialized harvester.
<i>Storage</i>	Large round bales	Bins with forced air	Controlled temperature drying
<i>Processing</i>	Retting and/or decortication processor	Pressing or cleaning	Chemical CBD extraction
<i>Best suited to</i>	Animal ag producers	Producers of cash grains	Vegetable growers
<i>Potential Prices</i>	\$0.07- \$0.11/lb	\$0.50-\$0.70/lb	Biomass trades on the percentage of CBD content on a dry weight basis per pound (CBD%/lb.)



PDA program

- 2019 program allows industrial hemp commercial permitting
- Unlimited permits and acres allowed
 - \$600 fee
 - Includes testing if selected
 - All workers must pass FBI background check, no felons
- Both domestic and international import of seed allowed
- Hemp only to be used for fiber and seed and CBDs
- Use of hemp seed, forage, oil or meal for feed production is *prohibited*



PDA program

- Plots will be randomly tested for THC
 - No details on when, or how many will be tested
- Landowners must allow PDA access for up to three years
 - Allows for follow-up inspection
- May not be within 3 miles of a medical marijuana grow facility (and vice versa)
 - There are no distance restrictions between CBD and non-CBD production areas. This may result in unintended pollination of CBD females

Risk Management and Issues

- Unknown quality or suitability of plants, seed
- Disease pressure – learning curve
- No ag chemicals will be labeled for 2019
- Rejection for weed contamination possible for fiber sales



Risk Management and Issues

- Finding markets & processing
- Interstate transport questions (not all states have regulations in place yet—vulnerable to local law enforcement interpretation)
- Storage
- “Hot” crop gets destroyed (Unexpected high THC)
- No federal multi-peril crop insurance available to cover lost production costs (private insurers do exist)
- Need for production data to develop revenue insurance policy
- Hemp & Enterprise CBD Budget Model by Tyler Mark and Jonathan Shephard from UK; Agricultural Alternatives, Penn State (Harper et al.) for Grain and Fiber: <https://extension.psu.edu/industrial-hemp-production>

Future questions/outlook

- Weed control is one of the biggest issues
- What are the markets? How big are they?
- What are the prices?
- How tough is the competition?
- How valuable is “local”?
- Will the CBD market continue or is it a bubble?

Stay tuned...



Hemp Day, August 6, PSU Extension. (356 attendees)

Pictures: Brittany Clark, PSU

Hop

- US: biggest grower of hop in the world (2018)
 - US: 57,468 acres (38%)
 - DE: 49,778 acres (33%)
 - CZ: 12,405 acres (8%)
 - CN: 6,630 acres (4%)



Hop

- Grows best between latitudes 35 and 55 degrees
- Preservative, bittering agent and aroma contributor in beer
- Location affects flavor, aroma, and bitterness of hops

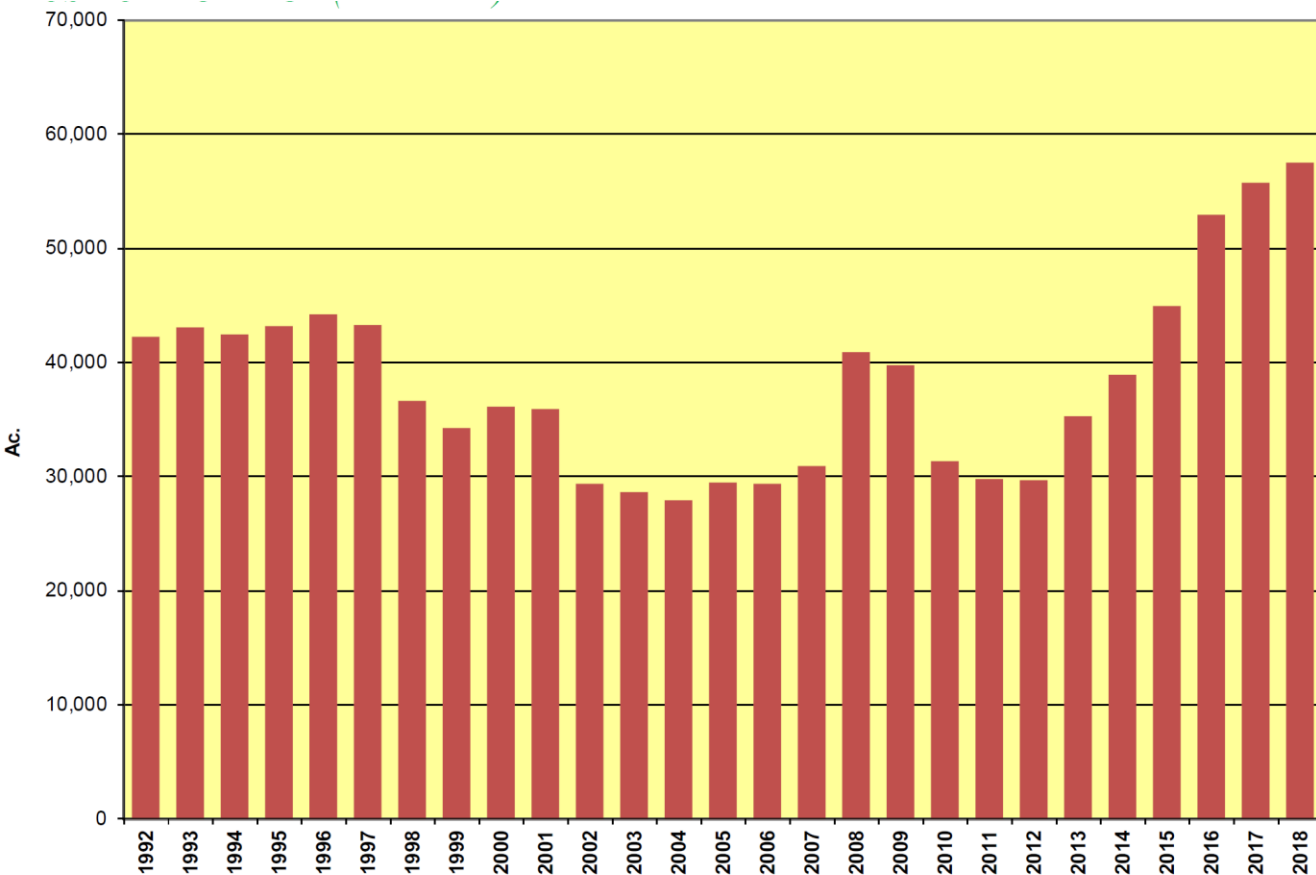
Center of American hop industry:

- Pacific Northwest states of Washington, Oregon, and Idaho

But... shift to places of historical production in the Northeast

- Alpha vs aroma hops

US Hop Acreage



- Since 2012 US hop acreage has increased 94.6%, from 29,683 to 57,772 acres
- NASS only surveys the PNW:

	ACREAGE HARVESTED			
YEAR	WASHINGTON	OREGON	IDAHO	TOTAL
2009	28,924	5,764	4,030	38,718
2010	24,336	4,622	2,331	31,289
2011	23,320	4,202	2,265	29,787
2012	22,696	4,391	2,596	29,683
2013	27,097	4,835	3,356	35,288
2014	28,858	5,410	3,743	38,011
2015	32,158	6,612	4,863	43,633
2016	37,444	7,765	5,648	50,857
2017	38,648	8,216	7,125	53,989
2018	39,170	7,725	8,140	55,035

Top 10 US Hop Varieties (acreage) 2013-2018

Rank	2013	2014	2015	2016	2017	2018
1	Cascade (5288)	Cascade (6619)	Cascade (6790)	Cascade (7581)	Cascade (7175)	Citra®, HBC 394 (6652)
2	Zeus (3825)	Zeus (4037)	Centennial (4401)	Centennial (5082)	Centennial (5534)	Cascade (6009)
3	Summit (2844)	Centennial (3353)	Zeus (3650)	Citra®, HBC 394 (4494)	Citra®, HBC 394 (5284)	Centennial (4864)
4	Columbus/Tomahawk (2336)	Summit (2522)	Simcoe®, YCR 14 (3306)	Simcoe®, YCR 14 (4331)	Simcoe®, YCR 14 (4598)	Zeus (3964)
5	Centennial (2175)	Simcoe®, YCR 14 (1886)	Citra®, HBC 394 (2993)	Zeus (3082)	Zeus (3539)	Simcoe®, YCR 14 (3916)
6	Nugget (2062)	Citra®, HBC 394 (1761)	Mosaic®, HBC 369 (1800)	Mosaic®, HBC 369 (2525)	Mosaic®, HBC 369 (2773)	Chinook (2839)
7	Chinook (1739)	Columbus/Tomahawk (1738)	Chinook (1787)	Chinook (1940)	Chinook (2429)	Mosaic®, HBC 369 (2768)
8	Citra®, HBC 394 (1315)	Chinook (1641)	Columbus/Tomahawk (1673)	Summit (1769)	Willamette (1657)	Columbus/Tomahawk (2138)
9	Simcoe®, YCR 14 (1298)	Nugget (1628)	Summit (1620)	Willamette (1561)	Summit (1616)	Amarillo®, VGXP01 (2734)
10	Super Galena™ (1250)	Willamette (1159)	Willamette (1359)	Columbus/Tomahawk (1416)	Columbus/Tomahawk (1413)	Pahto®, HBC 682 (1659)

Hops prices

Variety (pellet, 11 lbs, 2018)	\$/lbs
Cascade	5.23 – 18.00
Citra	29.00 – 33.44
Centennial	6.00 – 11.24

Hop Acreage Strung for Harvest 2019

- Record high 57,339 acres for Washington, Oregon, Idaho
- 4 percent ↑
- Top five hop varieties year are Citra®, Cascade, Simcoe®, Mosaic, and Zeus

U.S. Imports of Hops (lbs)

Rank	Country	2014	2015	2016	2017	2018
1	Germany	4,773,890	5,275,882	6,798,615	7,385,265	7,557,005
2	Australia	1,105,839	1,058,660	1,445,351	1,324,758	1,371,055
3	United Kingdom	1,150,152	1,434,107	1,411,179	1,095,477	932,996
4	New Zealand	933,878	807,333	675,276	678,142	875,235
5	Czech Republic	223,549	318,127	179,456	463,412	215,392
6	Slovenia	171,520	178,354	173,063	402,123	204,809
7	Canada	0	2,425	8,598	87,524	105,381
8	China	829,820	57,982	3,748	62,611	67,682
9	France	132,057	117,727	47,840	118,829	46,518
10	Italy	26,015	11,905	3,307	34,172	23,810

In pounds; extract is converted to fresh hop equivalent at a ratio of 4:1

HGA, 2018

US Hops Exports – Top 10 Countries (lbs)

Rank	Country	2014	2015	2016	2017	2018
1	Brazil	3,976,037	3,579,866	3,568,843	3,956,416	9,312,105
2	United Kingdom	8,261,823	7,837,874	10,755,471	9,549,543	7,613,443
3	Belgium-Luxembourg	4,897,348	4,125,290	3,709,498	5,526,327	7,363,219
4	China	3,603,455	4,116,692	3,458,171	4,652,194	6,981,378
5	Germany	2,918,700	3,868,010	5,226,058	3,772,550	6,586,971
6	Mexico	6,605,269	10,188,001	8,067,816	5,528,311	5,259,347
7	Canada	2,434,785	2,685,451	3,186,561	3,375,718	4,033,136
8	Argentina	886,479	983,262	727,525	1,087,540	2,573,676
9	Australia	1,055,573	1,014,567	1,349,009	1,651,483	2,130,327
10	Colombia	2,520,986	1,776,044	1,972,696	2,127,902	2,095,935

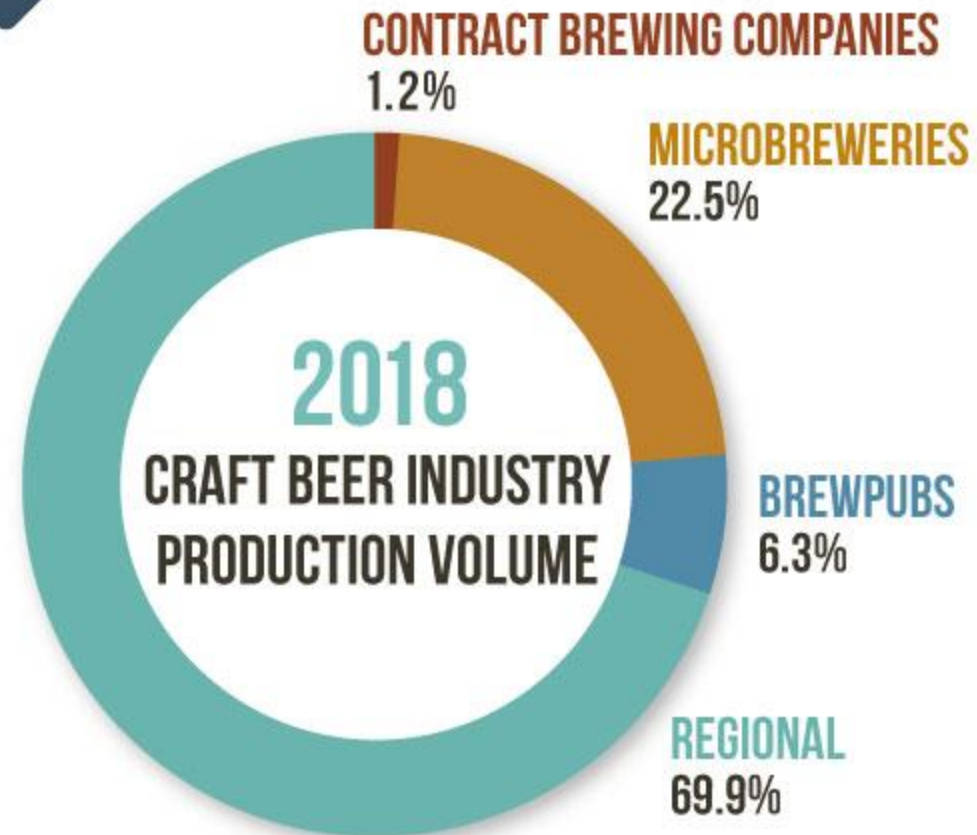
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HGA, 2018

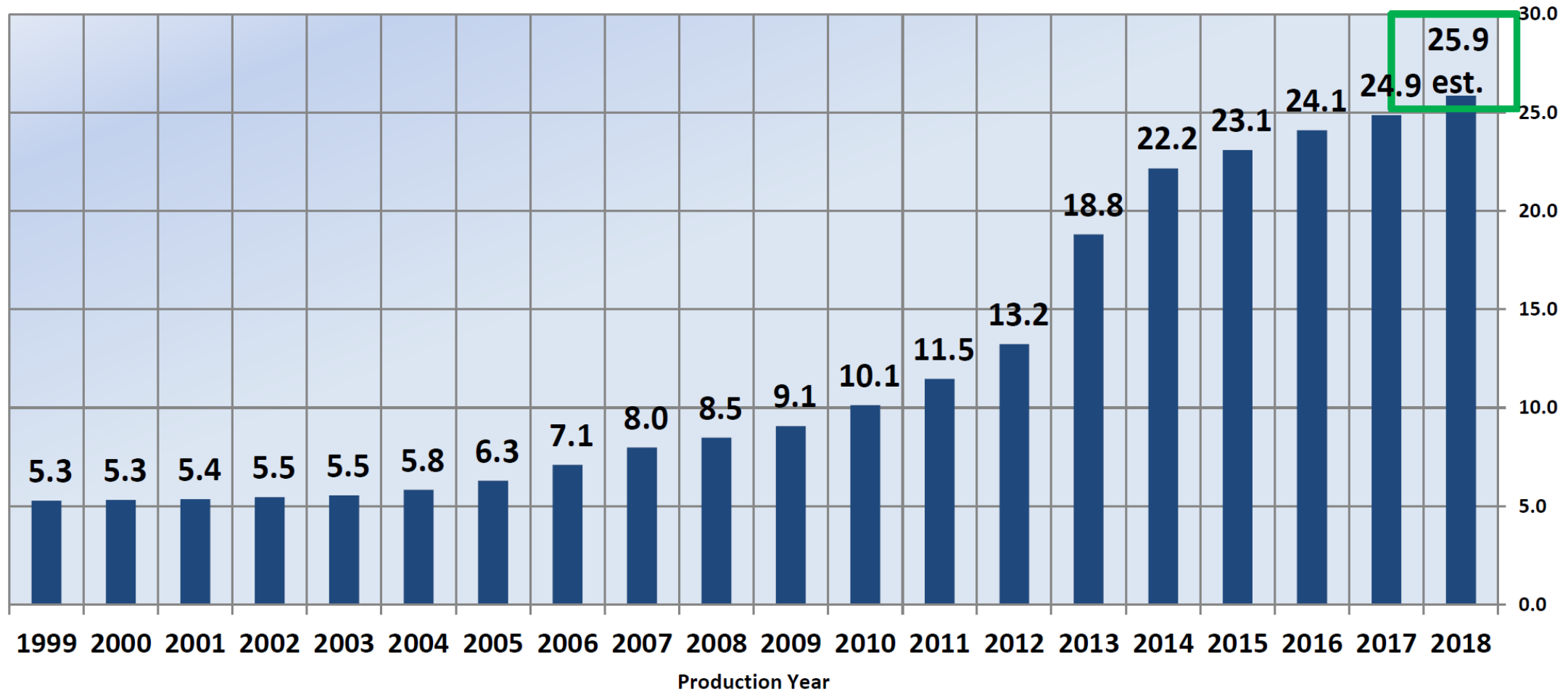
U.S. BEER PRODUCTION VOLUME 2018

OVERALL
BEER
-0.8%

3.9%
CRAFT

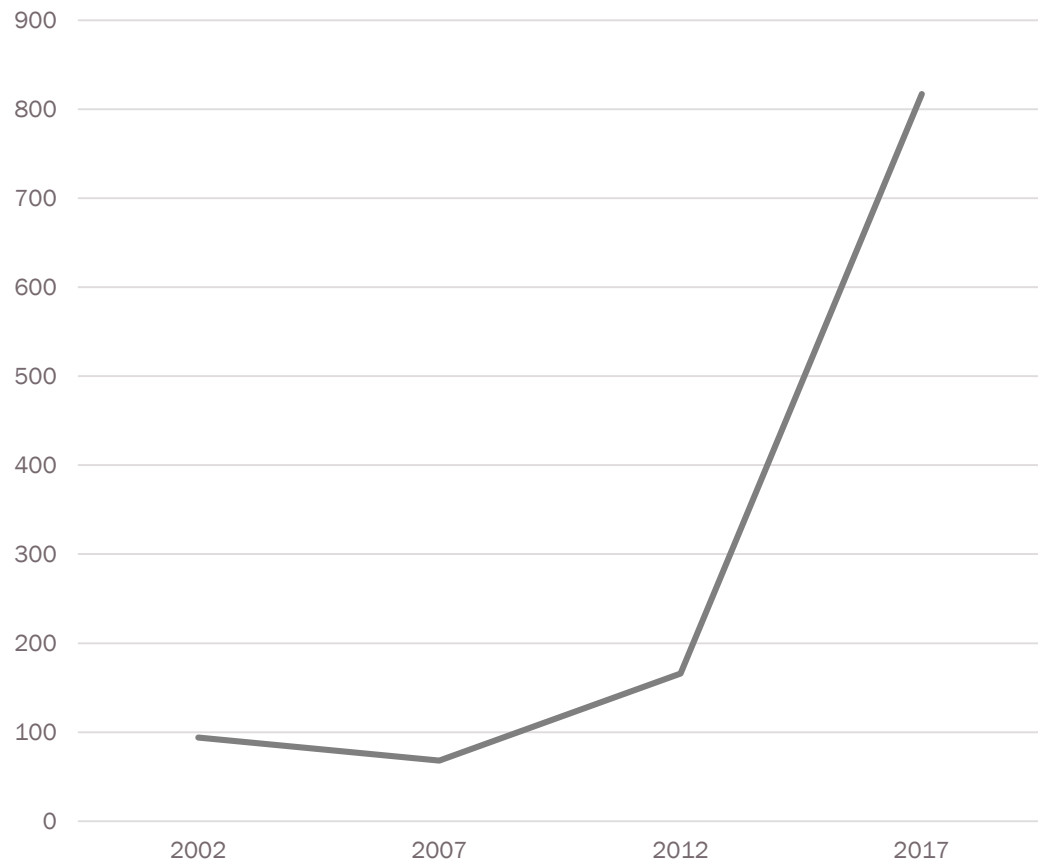


US Craft Beer Production Volume (MM US BBL)

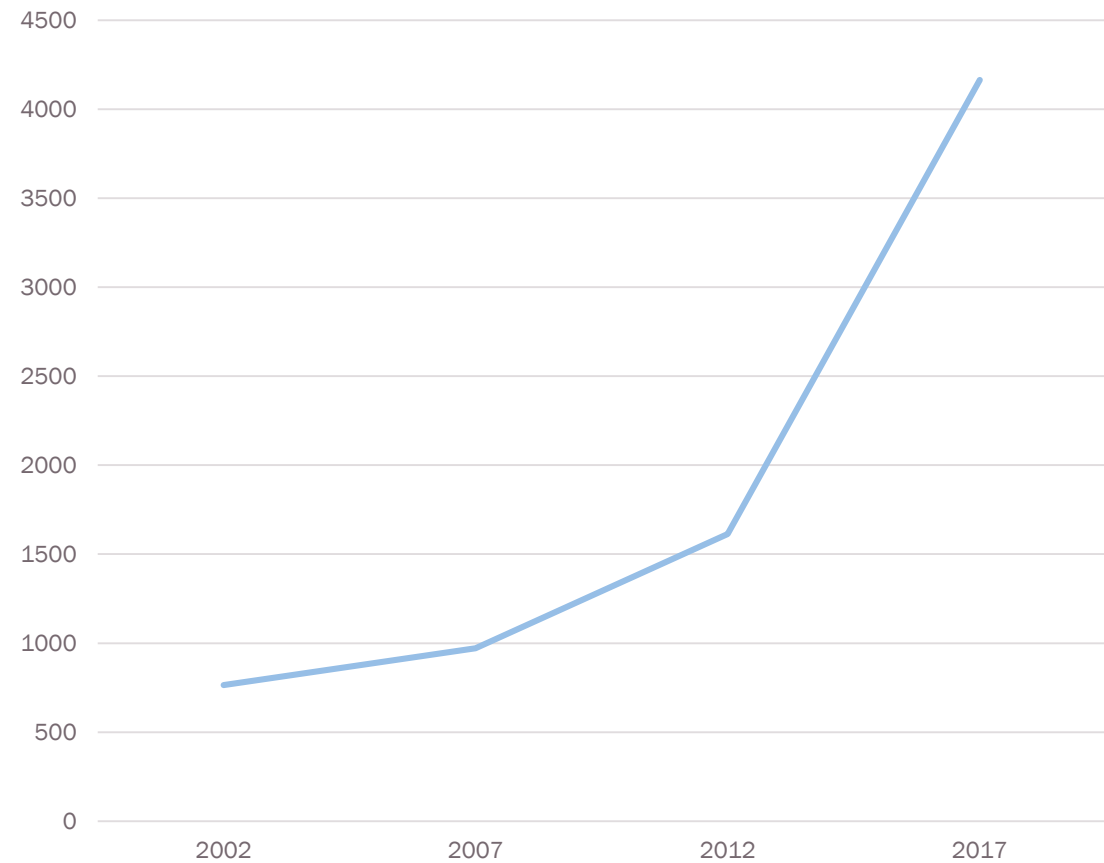


Number of Hop farms and Breweries

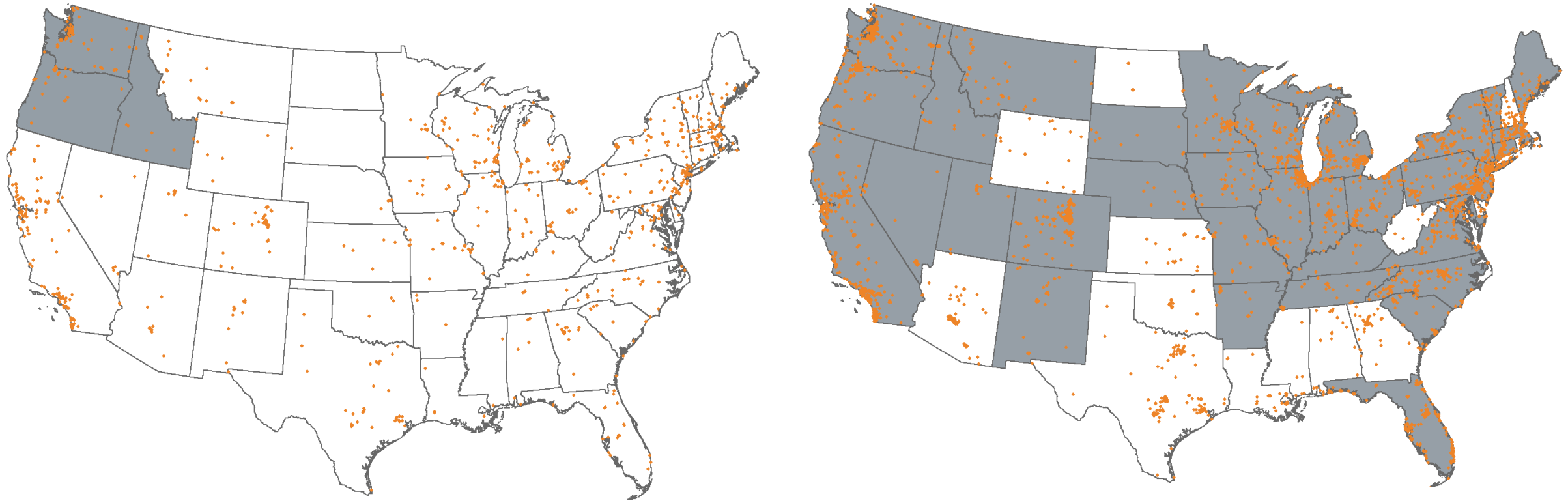
Number of Hop Farms, by Year



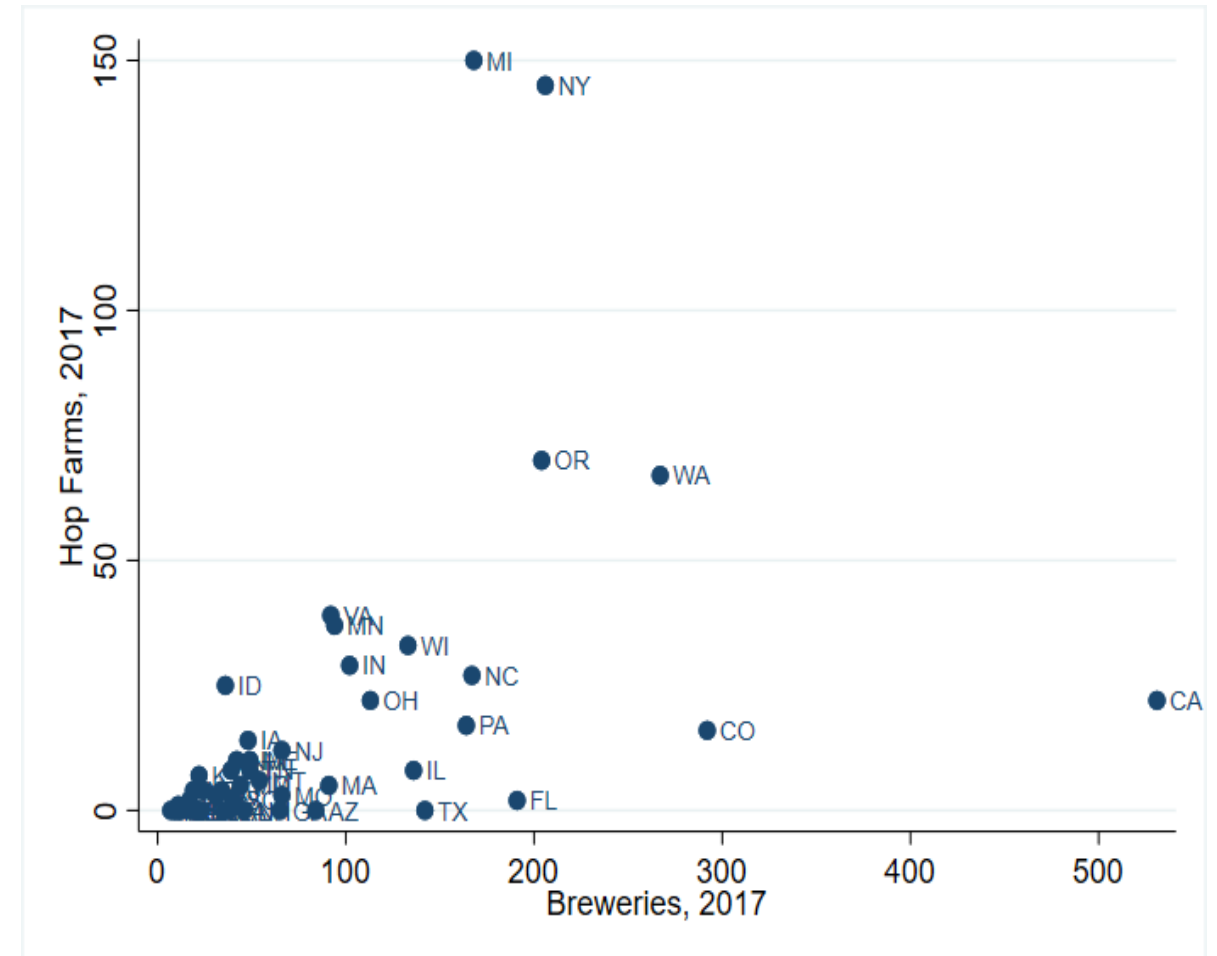
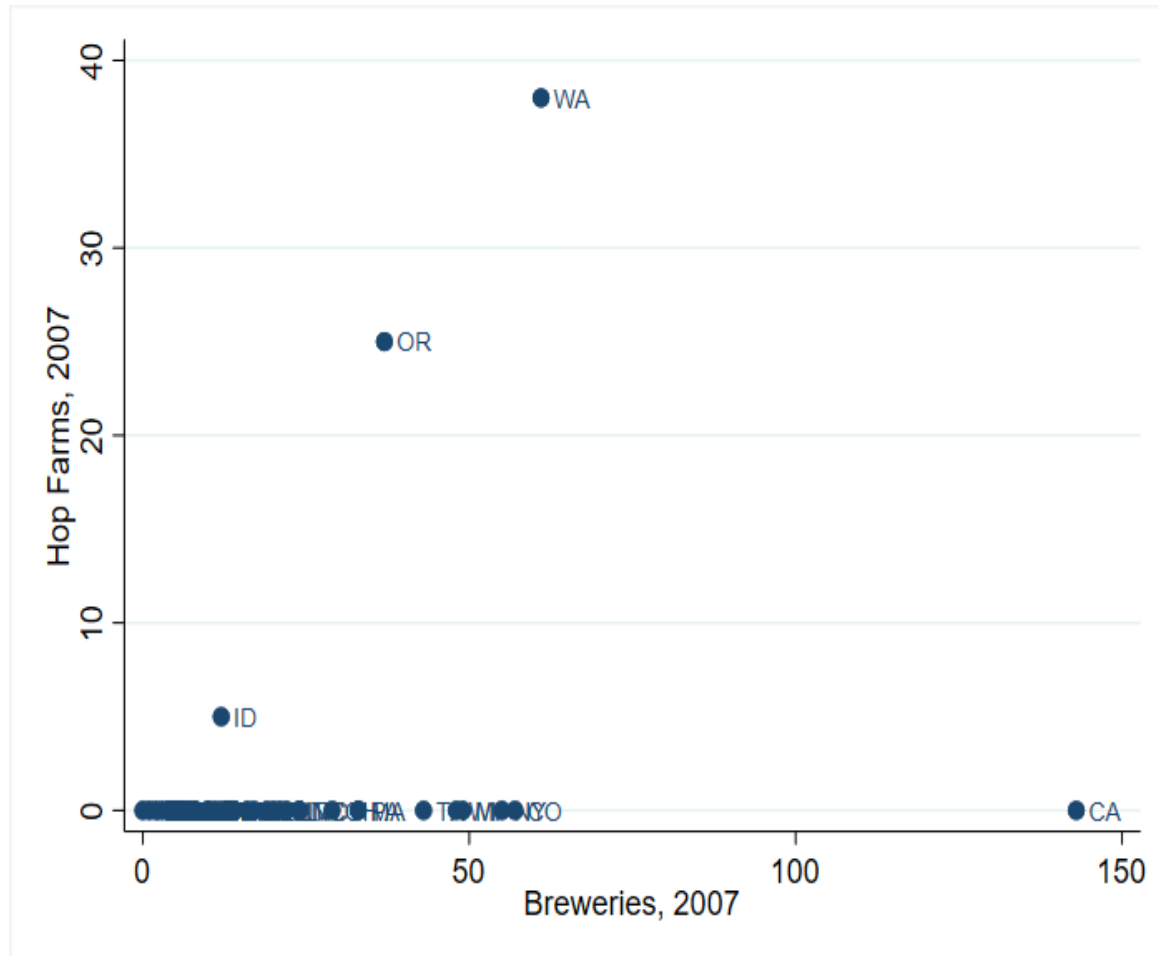
Number of Breweries, by Year



Location of Breweries and States Growing Hops, 2007& 2017



Number of Breweries and Hop Farms by State, 2007 & 2017



Outlook

- Craft beer boom or bust?
- Disease pressure outside the PNW
- Farm brewery law in New York State: New York State labeled beer; brewers do not need an additional permit to serve beer by the glass
 - 2018, >20% of the hops and 20% of all other ingredients must be grown in New York State.
 - From January 1, 2024, > 90% of the hops and 90% of all other ingredients must be grown in New York State.

Dobis, E., Reid, N., Schmidt, C. and S. Goetz. 2019. The Role of Craft Breweries in Expanding Local Hops Production. Presentation at the Annual Conference of the American Association of Wine Economists, Vienna

Hop Growers of America: 2018 Statistical Report

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Credits

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