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# **LR 171**

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**Interim study to examine buffer zone policies as a means to minimize conflict in the availability and utilization of bee forage resources**

**Staff Report to the Agriculture Committee**

**December 31, 2017**



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### Staff Report to the Agriculture Committee

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#### **LEGISLATIVE RESOLUTION 171** Introduced by Senator Tom Brewer

**PURPOSE:** The purpose of this resolution is to examine instruments for accomplishing the purposes of LB499, introduced during the 2017 legislative session, which sought to minimize conflict in the availability and utilization of bee forage resources between domestic apiaries and the temporary placement of out-of-state commercial apiaries during the bee foraging season.

The study shall:

- (1) Gather examples of distance buffers recommended by the beekeeping industry and regulatory standards utilized by other states;
- (2) Examine regulatory, enforcement, and educational measures available to accomplish the purposes of LB499;
- (3) Develop estimates of any costs to the state or other public or private entities; and
- (4) Develop options to fund any activities related to the purposes of the bill. The study committee shall solicit the advice and input of beekeeping organizations, individual beekeepers, and others with relative expertise.



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## Introduction

Nebraska’s beekeeping sector consists primarily of a number of domestic hobby to small-scale commercial apiaries more or less permanently located at fixed locations within the state, and a handful of larger commercial beekeepers who transport bees around the nation to provide pollination services for agricultural crops. Nebraska is also a destination for temporary placement of out-of-state based commercial apiaries during portions of the bee foraging season after pollinating periods are completed in other states. The placement of commercial apiaries can strain bee foraging resources at a location or an area (analogous to overstocking pastures with livestock beyond the carrying capacity of available grass forage) reducing the productivity and economic viability of domestic beekeeping operations in the vicinity. During the 2017 legislative session, the Agriculture Committee heard LB 499 which proposed a mechanism to impose a three mile buffer between commercial apiaries placed temporarily in Nebraska from out-of-state. The Agriculture Committee felt the need to gather additional information on the topic and to study regulatory, educational and other options that might be available to avoid and mitigate conflicts that arise in the placement of commercial apiaries.

## Nebraska Beekeeping: Overview

Beekeeping is a specialized niche of Nebraska agriculture. Nebraska is not a prominent producer of honey although bee culture is still practiced throughout the state. Beekeeping in Nebraska and elsewhere ranges from hobbyists who maintain only a few hives for pleasure and personal consumption, to producers who self-process and market honey and other beekeeping products directly to final consumers or supply to wholesale aggregators as a commercial activity. There are a handful of apiarists who maintain large numbers of colonies moved seasonally to other parts of the nation to provide pollination services for crops. This section provides information about beekeeping activity occurring within the state.

### Colonies and Production

The 2012 Census of Agriculture estimates that there were 238 beekeeping operations in Nebraska that were either part of a farming operation by census definition<sup>1</sup> or were separate beekeeping operations which themselves produced \$1000 or more of sales of honey and other beekeeping products. In the latter case, the owner may not necessarily engage in other farming activities or own the locations where apiaries are placed. While commercial beekeeping operations, those that keep bees to earn income from the sale of honey and other products and/or pollination services, are generally captured by Census survey, the estimate likely includes a small number of noncommercial beekeeping operations occurring on farms but excludes an indeterminate number of hobby beekeeping operations.

The National Agricultural Statistics Service of USDA produces annual and periodic reports on the number of honey producing hives, honey production and value of production by beekeeping operations having 5 or more hives for each state and the nation. As depicted in the following table, for Nebraska, the 2017 report released March 22, 2017 estimated for calendar year 2016, 2.2 million lbs. of honey taken from 48,000 hives located within the state for at least part of the year. The value of that production was estimated at \$4.1 million. Comparison of 2105 and 2016 is shown by the table.

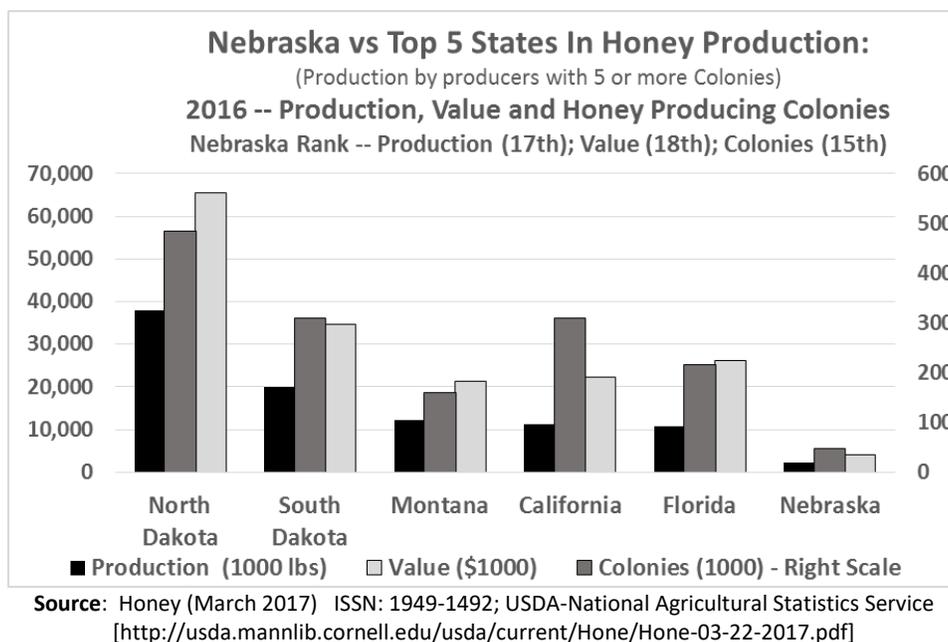
**Nebraska Honey Producing Colonies, Production and Value  
Operations having 5 or more colonies - 2015 & 2016**

	Honey Producing Colonies	Production (1000 lbs)	Value (\$1000)
<b>2015</b>	57,000	2,736	\$5,581
<b>2016</b>	48,000	2,208	\$4,151

**Data Source:** Honey (March 2017) ISSN: 1949-1492; USDA-National Agricultural Statistics Service [http://usda.mannlib.cornell.edu/usda/current/Hone/Hone-03-22-2017.pdf]

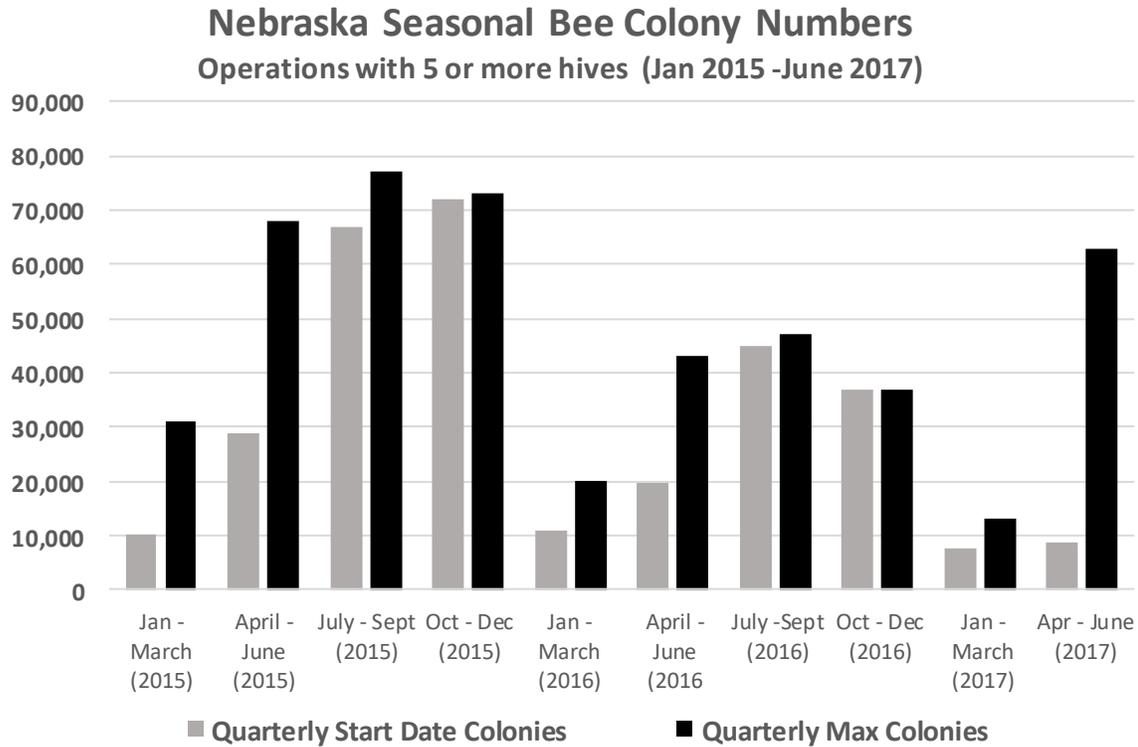
<sup>1</sup> The Census of Agriculture defines a farm as “any place from which \$1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the census year.” Beekeeping operations owned by farms are not necessarily a commercial activity of the farm. Apiaries located on a farm but not owned by the farm (farm owner merely hosts hives owned by others) are not counted in the census estimate of beekeeping operations unless the operation placing hives itself qualified as a farm, i.e. had \$1000 or more of sales of agricultural products.

The annual NASS Honey report is extrapolated from survey responses mailed to a sampling of beekeepers on lists of known beekeeping operations kept by NASS regional field offices. Nationally, the survey queries 3,300 producers with 5 or more hives and 20,000 beekeepers who maintain fewer than 5 colonies. Operations having 5 or more colonies are surveyed quarterly and information reported by state and for the nation as a whole. Operations having less than 5 colonies are surveyed only annually and information gathered for this group is only reported in the aggregate for the nation as a whole. Honey production by an unknown number of hobby producers is therefore not included in the estimate of Nebraska honey production in the table above. However, hobby production would not be expected to add significantly to the estimated total honey production for the state. Nationally, for 2016, total honey production from producers with 5 or more colonies was estimated at 161.8 million lbs. and only approximately .766 million lbs. produced by operations with fewer than 5 hives.



Nebraska is a relatively minor honey producer. The graphic above compares Nebraska in relation to the top 5 honey producing states in production, the value of honey sales, and the number of colonies located in the state at the time honey was taken for operations with 5 or more colonies. USDA attributes colonies and honey production to the state the colonies are located in when honey is harvested. Colonies moved from state-to-state may have honey collected in more than one state during the course of the year and those colonies are counted in more than one state. For 2016, Nebraska ranked 15<sup>th</sup> in honey producing colonies, 17<sup>th</sup> in honey production, and 18<sup>th</sup> in the value of honey sales.

Beginning in 2015, NASS expanded its survey to collect data for the Colony Loss Survey. The expanded survey collects data regarding movement of colonies between states, newly added or replaced colonies, number of colonies lost and renovated, and presence of colony stressors. The corresponding Honey Bee Colonies Report broken down by state is published semi-annually for beekeeping operations having 5 or more colonies, and again only annually as national totals for operations with fewer than 5 colonies.



**Data Source:** Honey Bee Colonies (May 2016 & August 2017) ISSN: 2470-993X; USDA, National Agricultural Statistics Service [http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1943]

The graphic above indicates that for operations with 5 or more colonies, the number of colonies present in the state fluctuates considerably throughout the year. The light bars indicate the number of colonies estimated to be present in the state on the first day of the calendar quarter, and dark bars represent a quarterly maximum defined by NASS as the sum of the number of colonies present on the first day of the quarter plus the number of colonies estimated to have been moved into the state during the quarter from survey data.<sup>2</sup> Based on this definition, some indication of the movements of bee colonies into Nebraska during the year can be simply calculated as the difference between the maximum number of colonies during the quarter and the number on the first day of that quarter. However, the number of colonies moved out of the state during any quarter is more difficult to determine from the data. The net difference between the number of colonies present on the first day of a quarter and the maximum number of colonies during the immediately preceding quarter may include colonies moved to another state during the preceding quarter but also reflects colonies discontinued or lost due to disease or other stress. These sources of reductions in the total number of colonies in the state from quarter to quarter would be offset by new colonies added by splitting or renovating colonies already in place. The USDA data as presented here may not accurately capture new hives added by such propagation.

As is evident, the number of bee colonies in the state maintained by producers with 5 or more colonies fluctuates in a seasonal pattern. During the period covered, the USDA estimated number of colonies by

<sup>2</sup> See “terms and Definitions of Honey Bee Colony Estimates” section of USDA/NASS Honey Bee Colony reports. Example: Page 19 of August 1, 2017 report *“Maximum colonies: Refers to the sum of colonies in a state on the first of the quarter plus all those moved into the state during that period. . . . It does not include the colonies that were added, lost, or renovated in the state.”*

producers with 5 or more colonies has ranged from 77,000 during the July-September 2015 quarter to under to 10,000 colonies on January 1, 2017. There are a comparatively small number of colonies that overwinter in Nebraska and are present on January 1 of any given year. The number of colonies in the state peaks in the July-September quarter as numbers are bolstered in part by colonies relocated to Nebraska during the spring after completion of pollination seasons elsewhere. There is a dramatic drop-off from the maximum number of colonies during the Oct – Dec quarter to the January 1 count due in part to colonies moved out-of-state in the fall months for pollination placements or to overwinter in warmer locations and in part due to colonies lost or discontinued during that period.

## Commercial Pollinator Services

The successful cultivation of many U.S. specialty and orchards crops is dependent upon commercial insect pollination. A subset of beekeepers earn income by placing bees to provide pollination services for these crops. The services of commercial honey bee pollinators are commonly arranged through a broker, and most beekeepers work on a contractual basis. Honey bees are largely preferred over other pollinators (e.g., bats, wasps, and butterflies) due to the relative ease of transporting population-dense colonies of active honey bees throughout the growing season. While beekeepers of any size may earn income from pollination, this economic activity is dominated by a relatively small subset of individual beekeepers or cooperatives with the capacity to supply hundreds to thousands of hives moved long distances around the country to efficiently meet pollination demand where and when it occurs.

### National Pollinator Market

A 2014 USDA publication<sup>3</sup>, estimated there were 387 beekeeping operations nationally engaged in providing commercial pollinating services. Producers located in six states account for 63% of such beekeepers. The March 22, 2017 NASS Honey report does not report the number of beekeeping operations earning income from pollination services, but estimates from producer surveys that beekeepers nationwide (5 or more colonies) collected approximately \$340 million in pollination fees in 2016.

The 2014 USDA article reported California leads the nation with an estimated 110 operations. Texas, Florida, North Dakota, South Dakota and Montana accounted for 133 operations. These states tend to lead the nation in commercial pollinator apiaries for two reasons. Either the state is a leading producer of produce and orchard crops that require supplemental pollination that supports and attracts a large pollinator sector, or are states in the upper Midwest that provide relatively abundant summer foraging resources after the pollination season has ended, both in the availability of supportive rural habitats and as relatively larger producers of summer flowering crops such as canola, sunflower and alfalfa.

Almost 80% of pollination service fees in 2016 were collected from producers of almonds, followed by producers of apples, blueberries, and cherries. Production of the top four crops grown by farmers requiring pollination services increased from 2007 to 2015. For the top 10 crops as a whole, growth averaged around 76 percent (in value of production terms) during that period. Over the same period, the number of honey-producing colonies grew by 9 percent (USDA-NASS, 2017).

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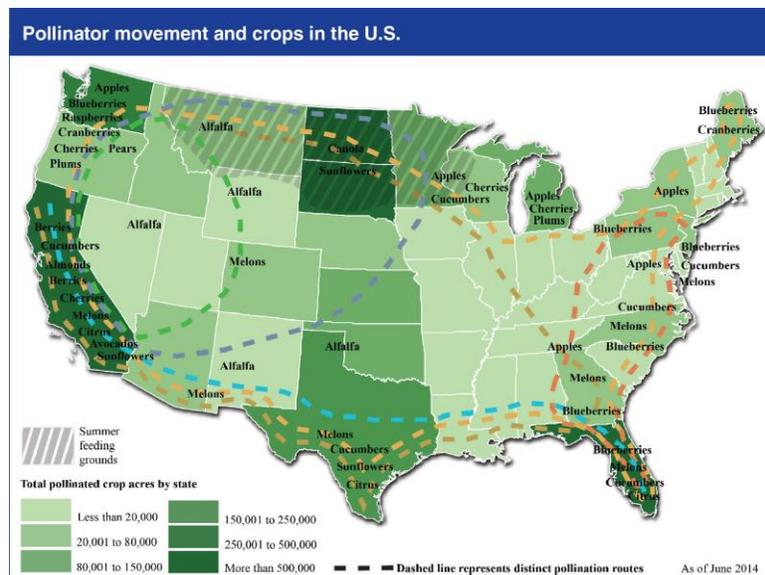
<sup>3</sup> *Fruit and Tree Nuts Outlook Special Article/FTS-357SA/September 26, 2014* Economic Research Service, USDA [https://www.ers.usda.gov/webdocs/publications/37059/49131\_special-article-september\_-pollinator-service-market-4-.pdf?v=41911]

### Top 10 crops by pollination value in 2016 and change in pollinated crop value from 2007 to 2015

Crop (region)	Colonies used in 2016		Total value of pollination, 2016	Price per colony in 2016	Value of production in 2015	Change in value of production, 2007-15 (inflation adjusted)
	Number	1,000 dollars	Dollars	1,000 dollars	Percent	
Almond (6&7)	1,680,000	280,560	167.0	5,325,000	93.9	
Apple (1,2,4,5,6&7)	183,400	10,167	52.6	3,394,185	13.8	
Blueberry (1,2,3,5,6&7)	147,000	10,166	66.5	584,150	59.6	
Cherry (1,4,5,6&7)	134,100	7,711	51.8	703,228	19.9	
Melon: watermelon, cantaloupe, honeydew (1,2,3,5,6&7)	133,500	7,156	53.6	825,072	-9.6	
Cranberry (1,5,6&7)	88,000	6,740	74.6	27,455	-1.3	
Alfalfa (6&7)	92,000	5,851	63.6	8,729,134	-13.8	
Plum (6&7)	46,000	2,962	64.4	104,760	-9.4	
Avocado (6&7)	69,000	2,815	40.8	295,797	-24.2	
Cucumber (1,2,3,6&7)	42,500	2,112	48.6	176,983	-35.2	
Other	362,300	17,977	49.6			
<b>All crops</b>	<b>2,977,800</b>	<b>354,217</b>	<b>119.0</b>			

Source: *Land Use, Land Cover, and Pollinator Health: A Review and Trend Analysis*; USDA-ERS Economic Research Report (ERR-232), June 2017. Data derived from analysis of USDA-NASS Cost of Pollination Survey

The graphic below provides a conceptualized depiction of regional concentrations of pollinator dependent crops and commercial pollinator colony movements. Note the areas of the upper Midwest that are shaded to indicate summer feeding grounds.



Source: USDA/Economic Research Service; *U.S. Pollination Services Market. Fruit and Tree Nuts Outlook*; Sept 26, 2014.

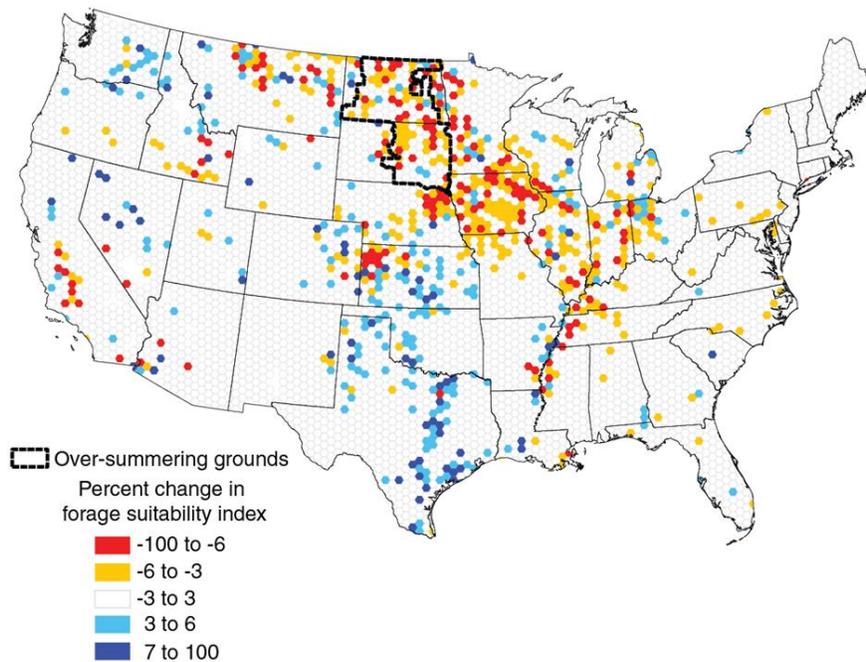
### Nebraska Participation

A number of crops grown in Nebraska depend on pollinating insects including alfalfa, vetch, sweet clover, sunflower, and other seed crops. Orchard, fruit and vegetable plantings grown in the state, and

plants important in soil conservation, benefit from bee pollination. The variety and quality of wild flowers and other species that occur in woodlands, meadows and other uncultivated areas also depend on pollinators. Even when grown commercially, pollinator dependent crops are grown largely as specialty crops in Nebraska. Because of the low density and dispersed production of these crops within the state, grower requirements for pollination are largely met through the grower’s own beekeeping activity or by other local beekeeping activity and pollinating insects that occur in the landscape. Nebraska is therefore not a destination state attracting commercial migrant beekeeping operations to supplement pollination services available locally.

Although Nebraska lies just outside the nation’s primary summer bee foraging areas of the upper Midwest states, areas of the state can provide sufficient quality and abundance of summer and fall bee foraging resources to support commercial bee operations. A handful of producers based in the state supply bees for supplemental pollination of crops grown in other states. The state may also attract summer placements of colonies of commercial pollinator providers headquartered in other states.<sup>4</sup>

**Decline in pollinator forage suitability between 2002 and 2012 concentrated in the Midwest**



Source: USDA, Economic Research Service analysis using land use/cover data from USDA’s National Resources Inventory and forage suitability scores from Koh et al. (2016).

Interest in, and perhaps competition for, summer bee forage range available in Nebraska may be on the rise due to reductions in bee forage quality occurring elsewhere, including in the Dakotas and other important summer foraging states in upper Midwest. The graphic above appears in a recent publication of the Economic Research Service of USDA<sup>5</sup> that reviews the literature on the effects of land use on forage availability and pollinator health to derive a bee forage suitability index for geographic areas

<sup>4</sup> Some commercial beekeeping operations that place hives for summer foraging in the state may be producers who own beekeeping operations in multiple states.

<sup>5</sup>Hellerstein, Hitaj, Smith & Davis; *Land Use, Land Cover, and Pollinator Health: A Review and Trend Analysis*; USDA-Economic Research Service Report #232 (June, 2017)

represented by small hexagons on the map. The study assigns a forage suitability score based on the relative presence or absence of bee forage crops and other habitats, changes in cropping patterns and husbandry practices over time, and other land use changes, including urban encroachment, that introduce or amplify stressors such as parasites and disease, pesticides, and human activities that interfere with bee behaviors. The study's methodology provides a means to measure and follow trends in pollinator forage quality across the U.S over time. The map above depicts where bee foraging resources are thought to have declined or improved between the years 2002 and 2012 based on suitability indicators. When averaged across the nation, the forage suitability index increased from 1982 to 2002 and declined slightly from 2002 to 2012. In important over summering honey bee regions of North and South Dakota and other parts of the upper Midwest, the decline from 2002 to 2012 is more pronounced. The graphic suggests that more severe to modest declines in bee forage quality extend into northeastern and central Nebraska but either modest improvement or stability in foraging resources occurred in other parts of the state<sup>6</sup>.

Because Nebraska does not currently track bee movements into and out of the state, there is no direct way to quantify the extent of Nebraska's participation in the national pollination services market, either as a supplier of migrant colonies for pollination services or as a summer foraging destination host state for commercial beekeeping operations based in other states. While USDA has recently begun more systematic monitoring of the pollination market through its annual Cost of Pollination Survey, the USDA publishes only nationally aggregated data. However, from the data for Nebraska seasonal bee colony numbers discussed previously in this report (see graphic in page 3) derived from semiannual USDA Honey Bee Colonies reports, estimates from producer surveys of colonies brought into the state each quarter suggest that as many as 60-65,000 colonies were relocated to Nebraska from other states during the course of the year in 2015 and as many as 35,000 colonies during 2016. One would presume that a large majority of colonies entering the state are migrant pollinator colonies, either Nebraska resident beekeepers returning colonies to the state at the end of pollination seasons elsewhere, or out-of-state based beekeepers placing bees in Nebraska for summer foraging purposes. However, USDA does not track the state colonies moved into Nebraska arrived from, nor is it possible to determine how many colonies brought into the state during parts of the year are owned by operators that live in, or whose operation is based in, Nebraska, and how many are owned by beekeepers residing in other states

On information from beekeepers, virtually all out-of-state movements of commercial migrant colonies located in the state during the summer/fall foraging season will be to either Texas or California, typically during the period of October through November. Both the states of California and Texas require entry permits for bee colonies imported into their respective states. Ag Committee staff inquired with authorities from both states whether their import permit data could be queried to determine how many shipments or colonies arrived directly from Nebraska or how many permits were requested by persons with Nebraska business addresses. Information provided verbally is summarized as follows:

- California requires carriers transporting bees to be inspected at various border entry checkpoints. While California entry permit data does not allow determination of state of residence of persons who own the bees entering the state, for each shipment, California does record the state where the bees were located immediately prior to entering California. For the period of October 2016 through February 2017 when the overwhelming majority of migrant colonies entered the state for the spring 2017 pollination season, California checkpoint records

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<sup>6</sup> See also Otto, Clint, et al. *Land-Use Change Reduces Habitat Suitability for Supporting Managed Honey Bee Colonies in the Northern Great Plains*; 113 PNAS 37, pgs 10430-10435 (Sept. 2016)

reveal that 72 inspected shipments of bees entering California originated in Nebraska. A semi-truck carries approximately 450-500 colonies apiece, translating to an estimate of 32,500 to 36,000 bee colonies originating in Nebraska.

- Texas entry permit data does not provide a means to track the state of origin for bees entering the state. Texas officials were able to query for Nebraska business addresses of persons requesting an entry permit. For 2016, there were four entities with a Nebraska business address that requested an entry permit.

Since 2004, Nebraska has not required an entry permit to bring bee colonies into the state. The Department of Agriculture was asked whether it had any entry permit data in its archives from prior to 2004. Only one item was recovered, a document entitled “Bees and Honey, 1998 Summary Statistics” reporting apiary program activities for 1998 that included handwritten updates for 1999 as of Nov. 17 of that year. The number of entry permits issued and the number of colonies entering under permit for these two years is presented in the following table:

**Nebraska Entry Permit Activity and Colonies Certified for Export (1998-1999)**

	1998	1999
<b>Entry Permits Issued</b>	23	18
<b>Colonies Entering Nebraska with Entry Permit</b>	33,412	23,150
<b>Colonies Certified to Leave the State</b>	15,181	15,142

Source: Bees and Honey, 1998 Summary Statistics; Nebraska Department of Agriculture

Note: Data for 1999 are from handwritten notes, not officially reported numbers, and may not include complete year data

For 1998, the document indicates the Department issued 23 entry permits and that 33,412 colonies entered under a permit. The 1999 data is somewhat questionable as they are not officially reported numbers and may not include complete year activity. The entry permit was required on all movements of colonies into the state and would have included colonies owned by in-state producers bringing bees back from temporary placements outside of the state for parts of the year. It is highly uncertain how representative these numbers would be to bee import activity occurring today, but are shown to provide a benchmark of past activity that may be helpful for planning purposes.

In conclusion, absent apiary registration or entry permit information, it is difficult to reach a reliable estimate of the number of bee colonies that enter and exit the state each year, or of the number of Nebraska based beekeeping operations serving the national pollination market. Interpreting from the indirect data discussed in this section, only a very speculative estimate of perhaps 30 – 40,000 colonies may be part of annual seasonal commercial migratory pollinator movements to and from Nebraska.

**Current Nebraska Apiary Regulation**

The Nebraska Apiary Act was first enacted in 1929 to help safeguard the state’s indigenous honey industry from disease, parasites and pests, including the regulation of entry of mobile commercial

apiaries that provided pollination services in other parts of the nation. At one time, the Act required annual registration of bee colonies and an annual health inspection of registered colonies, as well as an inspection of colonies prior to sale of 25 or more colonies. The Act also required operators to obtain an entry permit prior to moving bees into the state, and further required that colonies entering state be accompanied by a health certificate issued by the appropriate regulatory authority in the state of origin. Colonies brought into the state without a permit or health certificate were subject to quarantine until inspected by the state. The Department had authority to order quarantine and destroy colonies brought into the state not in compliance with entry requirements and those affected by pests and diseases, and to impose criminal and administrative sanctions for violations of the Act.

The Department's scope of responsibilities were funded through a combination of state general funds and cash funds generated from registration and import application fees, as well as fees for voluntary inspection services requested by beekeepers to certify colonies for shipment to other states, and other inspection charges for inspections performed in the course of enforcement activities. However, from 1992 to 2002, the number of apiaries registered in the state declined by 2/3 and the number of bee colonies registered declined by over half. A combination of declining beekeeping activity in the state reducing cash fund resources to support the regulatory program, and a reduction of general fund support due to state fiscal constraints in the early 2000's led to a series of legislative enactments to eliminate or change the Department's duties under the Act from mandatory to permissive. LB 436 enacted in the 2001 session eliminated the registration of bee colonies and also eliminated the requirement to obtain a health certificate when selling 25 or more bee colonies. LB 835 enacted in 2004, eliminated entry permit requirements and eliminated the duty of the Department to annually inspect apiaries.

The Department of Agriculture still retains authority under the Nebraska Apiary Act to perform voluntary health certifications requested by beekeepers, and to respond to occurrences of apiary diseases or pests, but the Department of Agriculture's activities are today exclusively complaint, incident or request driven. The Department no longer employs a state apiarist or field inspectors, and remaining Apiary Act duties have been assigned to the state entomology program.

### Elements of Full Apiary Programs

States exercise varying degrees of regulatory oversight with respect to beekeeping activity. The primary purpose of state regulatory activity is to protect the commercial beekeeping sector, and perhaps incidentally wild pollinator populations, from the introduction and proliferation of diseases and pests. Data generated by state apiary programs also help inform investment and policy decisions. State apiary programs may also provide services to assist management decisions of beekeepers. Only a handful of states enforce regulations intended to manage conflicts in forage availability.

Nebraska's reduction in activities carried out by the Department of Agriculture under the Apiary Act as described above is consistent with a nationwide trend toward a more minimal role of states in regulating beekeeping activity. State regulatory programs have traditionally been funded by combinations of state general funds, federal cost-share or grant funds, and regulatory fees assessed to the industry. Commercial and hobby beekeeping activity and honey production has declined in many parts of the U.S. straining the ability of the beekeeping industry to support a regulatory infrastructure through industry fees and undermining the economic justification for allocating scarce state resources to maintain full-fledged programs.

For purposes of LR 171, it is helpful to describe various elements of apiary regulation since state enforcement of commercial buffers typically occurs as an incremental responsibility of a state apiary program where resources and infrastructure may already be in place to carry out this responsibility at incremental cost. Additionally, enforcement of other elements of beekeeping regulation may provide mechanisms that facilitate compliance with, and minimize the incremental burden of enforcing, commercial buffer restrictions.

#### Beekeeper/Apiary Registration:

Registration of apiaries serves several functions. Registration fees are a source of revenue to support administrative and field staff needed to carry out the program. Additionally, registration generates data regarding the size and location of beekeeping activity to inform resource allocations and to assess the value of services and regulations provided the industry. States have varied from requiring essentially universal registration to exempting registration of apiaries containing less than a threshold number of colonies, to voluntary registration. Registration fees may be assessed per apiary location, by beekeeper based on the number of colonies, or a combination of these.

#### Inspection/Certification:

A system of annual or other periodic inspection serves the function of surveillance for diseases and pests that threaten the health and productivity of colonies. The ability to regularly monitor for diseases and pests of bees aids in early detection and triggers interventions to isolate affected apiaries in order to minimize opportunity for the disease or pest to spread to other apiaries and to require the beekeeper to take actions to treat or to destroy infested colonies. In addition to regular inspection, apiary regulations also help minimize the spread of disease or pests by requiring certification that apiaries are free of diseases or pests before colonies may be transported or sold. Certification inspections may be a mandatory requirement under some circumstances or offered as a service to beekeepers to enable them to meet import requirements imposed by other states or buyer specifications. Inspection and certification fees are a source of revenue to support the program.

#### Entry Permits:

A number of states require an entry permit to relocate bees to the state. Bees transported into a state without a permit are subject to quarantine and seizure. The entry permit provides a mechanism to monitor the movement of bees into a state and provide a mechanisms to limit the chance that imported bees introduce pests and diseases. In addition to the entry permit, states typically require that the bees be accompanied by disease/pest certification documentation during shipment issued by appropriate authorities in the state of origin prior to entry. States may require importers to identify prior to entry where colonies will be located. Apiaries that do not conform to entry requirements alerts regulators to colonies that present a heightened risk of disease or pests to justify regulatory responses. Where states impose a commercial buffer between locations of imported colonies and established or protected apiary locations, the entry permit provides a mechanism to obtain compliance prior to entry and minimize the burden of post entry enforcements since the permit can be denied if the identified locations are in conflict with buffer policies. States typically impose entry permit fees, and such fees export some of the cost of the apiary program to commercial migratory beekeepers whose transport of bees can be a vector for spread of disease and pests from other areas of the country.

## Setback Policies: Purpose, Examples and Considerations

Much like a pasture may be overstocked with livestock, available bee foraging resources in a given area may be overstocked if too many hives are placed within proximity. Excessive competition among colonies for available forage results in reduced honey production and nutritional deficiencies that increases a colony's susceptibility to stresses such as disease, pests and pesticides. In addition, contact of bees from different apiaries in overstocked foraging ranges increases the opportunity for transmission of disease and parasites.

A small number of states have attempted to mitigate or avoid overstocking of bee forage by imposing distance buffers between commercial beekeeping operations. Typically, beekeepers register established apiary locations which precludes other beekeepers, or certain categories of beekeepers, from locating apiaries within a certain distance of registered locations. LB 499 proposes a similar protection for Nebraska commercial beekeepers. This section briefly discusses foraging ranges of bee colonies, describes regulatory buffers enforced by other states, and concludes with considerations in designing buffer regulations should the Legislature wish to pursue that course.

### Bee Foraging Range

A colony's food supply consists primarily of nectar and pollen from blooming plants within flight range. Nectar contains carbohydrates as a source of energy. Pollen provides the protein and trace minerals that are mostly fed to the brood in order to replace bees lost in the normal course of life cycle and colony activity. As a rule of thumb, beehives meet their nutritional and energy needs within a foraging area that extends up to a two-mile radius from the hive, although various research have documented bees foraging at much greater distances. Some research has suggested that the maximum effective foraging range is about 4 miles, which is the distance the energy expended by individual foraging bees exceeds the energy of the nectar and pollen supplied to the hive. However, other research suggests the energy cost hypothesis does not necessarily dictate a maximum foraging distance. Other factors may determine the willingness of bees to forage at greater distances.<sup>7</sup>

The actual foraging range for any individual hive follows seasonal patterns and is influenced by several factors including colony size and strength, nutritional needs of the colony, the quality, locations and abundance of forage resources in proximity to the hive and

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<sup>7</sup> Literature consulted for this section includes: Couvillon, M., et al. *Honey Bee Foraging Distance Depends on Month and Forage Type*; Apidologie, 46-1 pp 61-70; Abou-Shaara, H.F., *The Foraging Bavior of Honey Bees, Apis Mellifera: A Review*; Veterinarni Medicina 2014(1): 1-10; Esch, H. & Burns, J., *Distance Estimation by Foraging Honeybees*, Journal of Experimental Biology 199, 155-162 (1996); Traynor, J., *How Far Do Bees Fly? One Mile, Two, Seven? And Why?*, Bee Culture, June, 2002 [accessed at Beesource website --<http://beesource.com/point-of-view/joe-traynor/how-far-do-bees-fly-one-mile-two-seven-and-why/>]

competition for these resources. Maintaining colony health requires forage access to a diverse source of pollens in order to acquire the full range of nutrients and trace minerals necessary to support various bee and colony functions. Even where a hive's foraging activity can be concentrated on a relatively abundant forage resource located nearby, bees may at times bypass this source in order to collect pollens from more diverse choices of forage at greater distances.

Whether a particular bee foraging habitat is overstocked depends on the number of bees attempting to forage as well as the carrying capacity of the forage resource, i.e. the density, health and diversity of nectar and pollen producing vegetation. A particular location may be a sufficient common foraging site for two or more apiaries in relatively close proximity if the combined number of bees utilizing the site does not exceed the available nectar and pollen available. Foraging resources within the foraging range of two or more apiaries may also not necessarily result in nutritional deficiencies for multiple colonies utilizing the site in common if the apiaries have other available foraging resources.

### **Setback Policies as Resource Allocation**

Some informal allocation of forage resources occurs today. Beekeepers typically have exclusive right to strategically place bees on a landowner's property, and simply by proximity have best access to forage occurring on the landowner's property and perhaps nearby adjacent property. But beekeepers do not have any ability to preclude conflicting apiaries on neighboring lands other than the voluntary cooperation and practical considerations of other beekeepers, or through whatever private agreements the beekeeper might negotiate with other nearby landowners.

Buffer restrictions are in effect a more formal, regulatory method of allocation of available bee pasturage, essentially allocating use of bee forage to the first person to register a location, somewhat like a first in time, first in right priority allocation of surface waters. The resulting exclusivity of use can serve economically and environmentally valuable purposes. The ability to secure preferred and priority use of bee forage resources in a given area can encourage private commercial beekeeping investment of the types and scale to make optimal use of the foraging resource. Exclusivity of use may also enhance the economic feasibility of landowner investments in more diverse, specialized crop plantings and other habitat enhancements and land management decisions to optimize forage quality and abundance. Such enhancements, which might not otherwise occur if the benefits of that investment were diminished by other apiaries in proximity utilizing the location as a common foraging site, may provide environmental services of benefit to the broader public. LB 499 is in fact brought on behalf of a beekeeper who had worked over several years with a landowner to bring about bee forage enhancements on the landowner's property but the ability to realize the fruits of that investment was undermined by a large, out-of-state based commercial apiary locating a large number of hives nearby.<sup>8</sup>

While buffer restrictions on apiary placement can theoretically result in more economically optimal allocation of bee forage resources in some cases, states that enforce setback regulations have taken

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<sup>8</sup> Written testimony of Edward and Susan McDonald (exhibit 1), Nebraska Legislature Agriculture Committee public hearing for LB 499, February 14, 2017

steps to narrowly tailor buffer restrictions to minimize monopolization of bee forage resources that unnecessarily precludes access to otherwise common forage utilized by small scale commercial and hobby beekeeping. Buffer restrictions in effect reserve exclusive use of bee forage resources within a distance of a registered apiary to the first person to register a location. A buffer defined as a 2-mile radius from a registered apiary encompasses an area of 12.6 square miles (area =  $\pi r^2$ ) or 8,043 acres. The area bounded by a 3-mile radius is 28.3 square miles or 18,096 acres. Such area is likely to extend beyond the boundaries of the property a registered apiary is located on and thus impair surrounding landowners' ability to allow utilization of their property for beekeeping.

It is apparent that an individual beekeeper registering multiple sites could essentially exert control of apiary placements over a considerable area. In addition to the potential of making it more difficult for other beekeepers to have access to suitable bee forage range, monopolization can also result in less than optimal utilization and give unintended economic windfall to those who secure protected sites. The ability to limit foraging competition enhances the value of beekeeping operations that first secure the buffer protections. There may be an incentive to register more locations than currently fully utilized in order to secure range for future growth of the beekeeping operation. Also, beekeepers securing range they themselves do not fully utilize may be in a position to extract rents from other beekeepers to have access to the forage, in effect privatizing and transferring control of allocation of what otherwise would be a common resource. For these reasons, states have imposed various restrictions on the ability to register locations afforded setback protections. These are presented in the "Setback Design/Policy Considerations" subsection at the conclusion of this report.

## Examples of State Setback Restrictions

The table on the next page describes setback restrictions for placement of apiaries for five states that enforce policies to protect the foraging range of established apiaries from being overstocked by newly established apiaries. Arkansas, Montana and South Dakota require a 3 mile separation between apiary locations, Wyoming 2 miles and New Mexico 1.5 miles. As the table indicates, there are some exceptions to the general separation rule. All states exempt apiaries placed on land owned by the beekeeper even if within the buffer exclusion zone of an existing apiary registered by another beekeeper. States may also exempt apiaries established by beekeeper within the exclusion zone of another apiary registered by the same beekeeper provided the new apiary does not conflict with any other registered apiaries. In one form or another, states generally do not apply the buffer restrictions (i.e. allow an apiary to be placed within the exclusion zone of a registered apiary) to hobby bee yards and temporary, seasonal apiaries established for crop pollination. In the latter case, such apiaries are typically registered by the owner of the land where the pollinated crop is grown.

The buffer restriction afforded to apiaries in these states is in each case perfected by registration which functions to give notice to the state agency overseeing the program and to other beekeepers of the existence and location of an apiary and any exclusion zone that applies. However, in each of these states, apiary registration is mandatory. Registration is universal in all states except New

## Summary of State Laws Regarding Apiary Buffers

State	Cite	Buffer Restriction	Exceptions to Buffer Applicability	Apiary Registration Required?	Entry Permit Required?	Inspection Program	Comment
Arkansas	Ark Code 2-22-101 through 112	3 miles from registered apiary location. Locations in conflict cannot be registered	Apiaries located on land owned by beekeeper	Yes -- Mandatory & universal registration of apiaries (apiary defined as place where one or more colonies are kept). Registration is 1 time unless significant change in location or operation. Beekeeper may register one location per 10 colonies first 1000 colonies and one location per 20 colonies above 1000	No -- But non residents required to register locations before placement that comply with buffer restriction Imported colonies must be accompanied by health certificate	Regular inspection of all apiaries. Frequency of inspection may vary based on risk	Regular inspection of all apiaries. Frequency of inspection may vary based on risk
New Mexico	New Mex Bee Law 76-9-1 through 13	1 1/2 miles from registered commercial apiary	* Apiaries located on land owned by beekeeper * Temporary apiaries established for pollination with special pollination permit	Yes -- only for commercial apiaries Initial registration & annual renewal	No -- But bees moved into New Mexico must be accompanied by health certificate, and landowner receiving bees must give notice of location and notice of arrival. Bees are inspected upon arrival	Yes -- annual Inspection	Yes -- annual Inspection
South Dakota	South Dak Code 38-18-1 through 37	3 miles	* Apiaries located on land owned by a beekeeper * Exceptions permitted by department	Yes -- Annual registration of apiary location (no exclusion by size). Landowner may rescind registration.	Yes -- Application for permit required 30 days prior to entry. Application to be accompanied by health certificate. Failure to apply for permit is criminal violation. Colonies entering without permit may be declared nuisance	Yes -- Statute does not prescribe frequency, but Department attempts annual inspection but may adjust inspection schedule based on risk. Department has authority to perform inspection upon request or upon reason to believe inspection is necessary	Yes -- Statute does not prescribe frequency, but Department attempts annual inspection but may adjust inspection schedule based on risk. Department has authority to perform inspection upon request or upon reason to believe inspection is necessary

State	Cite	Buffer Restriction	Exceptions to Buffer Applicability	Apiary Registration Required?	Entry Permit Required?	Inspection Program	Comment
<p><b>Montana</b></p>	<p>Mont Code 6-80-6-101 through 115</p>	<p>3 miles from location of registered general apiary site. Locations in conflict cannot be registered</p>	<p>* Apiary placed within 3-mile restriction of registered general apiary owned by same person                      * Apiaries existing within 3 mile restriction of another registered apiary if registered before 1981                      * Hobbyist, pollinator and landowner sites not required to meet 3 mile buffer from general apiary sites                      *General apiaries not required to meet 3 mile buffer from registered hobbyist, landowner or pollinator site</p>	<p>Yes -- Mandatory annual registration (Except registration voluntary for hobbyists)                      -- 4 registration categories;                      * general - all apiaries other than landowner, pollination and hobbyist                      *Landowner -- Apiary on land owned by beekeeper                      * Pollinator -- temporary apiary sites for crop pollination (registered by landowner of pollinated crop)                      *Hobbyist -- persons having no more than 5 colonies</p>	<p>No -- But bees imported must be placed on registered site and be accompanied by health certificate and disease/pest free certification. Importers must notify Montana Dept. of Ag prior to entry</p>	<p>No regular inspection required. Department has authority to perform inspection upon request, when bees imported without health inspection, or upon reason to believe inspection is necessary</p>	<p>No regular inspection required. Department has authority to perform inspection upon request, when bees imported without health inspection, or upon reason to believe inspection is necessary</p>
<p><b>Wyoming</b></p>	<p>Wyoming Apiculture Act 11-7-130 through 407</p>	<p>2 miles</p>		<p>Yes -- Mandatory annual registration;                      -- 4 registration categories;                      * general - all apiaries other than landowner, pollination and hobbyist                      *Landowner -- Apiary on land owned by beekeeper                      * Pollinator -- temporary apiary sites for crop pollination (registered by landowner of pollinated crop)                      *Hobbyist -- persons having no more than 5 colonies</p>	<p>No -- But person importing bees must notify Department within 14 days of entry and request inspection</p>	<p>No regular inspection required. Department has authority to perform inspection upon request, when bees imported without health inspection, or upon reason to believe inspection is necessary</p>	<p>No regular inspection required. Department has authority to perform inspection upon request, when bees imported without health inspection, or upon reason to believe inspection is necessary</p>

Mexico which requires registration only of commercial apiaries, defined as bee yards with more than 15 or 25 colonies depending on whether located in the northern or southern portion of the state. Maintaining an apiary without registration is grounds for removal and both administrative and potential criminal sanction. Each of the states maintain relatively comprehensive and robust apiary programs supported in part by registration fees.

Much of the impetus for protecting the summer and fall foraging range of apiaries relates to forage competition presented by the seasonal entry of migratory apiaries. As discussed previously, these are typically large commercial operators that require summer foraging resources for thousands of hives upon completion of spring pollination seasons in other parts of the nation. Some migratory beekeeping operations that locate within a state during the summer and fall are those of resident beekeepers while others may be owned by nonresidents. The states examined do not discriminate against out-of-state beekeepers in the allocation of protected bee foraging range. State registration requirements that prohibit location of hives within an exclusion zone of registered sites apply equally to apiaries established by domestic or out-of-state beekeepers. Thus registration may help preclude out-of-state migrant beekeepers from intruding on the forage resources relied upon by domestic beekeepers, but also, protects sites registered by nonresident beekeepers.

It should be noted that each of the states examined maintain a more comprehensive apiary program than Nebraska. In addition to registration of apiaries, these states implement annual or periodic health inspection, monitor and regulate movements of bees into and out of the state, as well as provide inspection, certification and other services to the beekeeping industry. These state apiary programs employ a staff of field inspectors and administrative staff that the state beekeeping industry supports at least in part through the registration, inspection, certification and other fees charged to the industry. In other words, these states have a regulatory infrastructure in place to carry out a range of apiary program requirements. Enforcement of a buffer restriction is therefore an incremental enforcement burden and cost.

## **Setback Design/Policy Considerations**

Based on the review of other state programs that implement buffer restrictions to avoid overstocking of bee foraging resources and literature reviewed, this section concludes with a list of considerations to guide statutory authorities and administrative implementation should the Legislature desire to enact some manner of buffer restriction.

### **1. Avoiding/Mitigating Monopolization of Range Concerns**

To avoid and mitigate issues of monopolization of bee forage range that setback policies may present as discussed previously, the following could be considered:

- A. Set maximum # of sites any one beekeeper may register
- B. Limit registration of sites to actual beekeepers who will stock bees at the site
- C. Limit assignability or transferability of registered locations
- D. Impose a minimal utilization requirements, i.e. require a minimal number of colonies to be placed at the registered location, to register a site.

- E. Exclude applicability of setback restrictions to hobby and smaller scale commercial beekeepers. Perhaps limit restrictions on placing an apiary within a buffer distance of an existing registered apiary to large commercial beekeeping
- F. Require concurrence of the landowner to the registration, with landowner authority to independently rescind the registration.
- G. Authorize the Department to remove registrations for disuse or abandonment, and flexibility to waive the setback restriction if an apiary’s location within the buffer restriction of a registered apiary does not present a disease or overstocking issue. Require non-residents to annually renew registrations.

## 2. Private property restrictions

As discussed previously, setback restrictions are likely to operate beyond the boundaries of the property a particular registered site may be located upon, imposing a restriction on the use of other landowners’ utilization of private property. States have excluded application of the setback restrictions from an existing registered apiary to new or existing apiaries located on property owned by the beekeeper. Additionally, the Legislature may wish to consider a strong statement articulating the public welfare purposes of the setback policy such as the following example from the Montana apiary law:

*“Montana Code 80-6-111 General apiary site registrations. (1) In order to control, limit, and prevent the spread of bee diseases, pests, and other contagious or infectious diseases among bees, hives, and apiaries and to control, limit, and prevent interference with the proper feeding and honey flow, as it relates to bee health of established apiaries, general apiary sites must be located 3 or more miles apart except as otherwise provided in this part.”*

## 3. Consider reinstating an entry permit requirement

The reinstatement of the entry permit may provide a simplified administrative mechanism to help assure compliance with the 3 mile buffer. Requiring the permit applicant to identify locations where the bees will be placed after entry into the state makes it more likely that location conflicts would be resolved before the bees enter the state, avoiding the Department having to employ and utilize resources to enforce after the bees have entered. The permit requirement should apply to all importations, regardless of whether the importer is a resident or whether the bees are domiciled primarily in Nebraska or another state to avoid interstate commerce conflict. The entry permit would provide a mechanism for exporting some of the cost of implementing the program to out of state beekeepers that impose the burden that a setback policy addresses. However, reinstating an entry permit requirement imposes a regulatory requirement Nebraska beekeepers do not currently face. It is uncertain whether sufficient registration and permit fee revenues would be sufficient to support the incremental administrative and enforcement resources the Department would need to deploy.