

# POLICY COHERENCE OF INVASIVE INSECT SPECIES POLICIES IN THE SOUTHEASTERN UNITED STATES

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#### ABSTRACT

*Invasive insect species, or non-native species introduced through human activity that can proliferate outside their ecological range, continue to cause significant economic and environmental harm in the United States. These harms include reduced biodiversity, ecosystem functions, and food security. Invasive insect species largely spread through international and interstate trade by way of wooden shipping crates and other forest products. Policy can provide a gateway to decreasing the spread of these species and to abate the introduction of new invasive insect species and current populations.*

*At the federal level, there is no primary, cohesive policy that standardizes invasive species management in the United States. This Essay focuses on state level policies for invasive insect species management using a coherent policy framework to assess the uniformity of state statute policies in 13 southeastern states. The objective of state statutes dealing with invasive insect species management is to provide proactive guidelines that promote the prevention of outbreaks as well as aggressive treatment of infected lands. Positive horizontal policy coherence is present to varying degrees across states, as states are implementing similar policy action and principles across state lines during an invasive insect species outbreak. However, this uniformity varies greatly between state lines and exacerbates the weakest link issue. For example, South Carolina has very proactive invasive insect species policies, but it is surrounded by states that have weaker proactive policies, specifically Georgia and North Carolina. This leaves South Carolina more susceptible to outbreaks.*

*Steady guidance from the federal government—encouraging or even requiring reform at the state-level to promote uniformity in prevention and eradication of invasive insect species—can promote rapid and cost-effective management of these species to protect important agricultural commodities, such as forest production. Reform at the state-level could also connect and organize intra-agency cooperation between agencies not listed in the current statutes.*

*Intrastate reform can potentially evolve into public cooperative education and engagement for preventative measures for agricultural landowners.*

## I. INTRODUCTION

Invasive species are defined as non-native species whose introduction can cause economic, human, and environmental harm.<sup>1</sup> Recent estimates place the global economic damage from invasive insect species at around \$70 billion per year, with health costs of over \$6.9 billion per year.<sup>2</sup> Invasive species contribute to a significant loss of agricultural crops and substantially impact food security.<sup>3</sup> Crop and forest production losses caused by invasive species cost the United States billions every year.<sup>4</sup> Environmentally, invasive species imperil natural areas and ecosystems by reducing biodiversity,<sup>5</sup> ecosystem services, and resilience.<sup>6</sup> These environmental impacts can also endanger humans. Health-invasive species have been found to create air pollution sinks due to decreased native ecosystem functions.<sup>7</sup>

In the last 50 years, there has been an exponential increase in merchandise trade, which has correlated with an increased rate of invasive species introduction.<sup>8</sup> International and interstate trade are largely responsible for the translocation of invasive insect species, as invasive insect species thrive in live plant and wood packaging materials.<sup>9</sup> Efforts have been made to eradicate such

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1. David L. Bergman et al., *The Economic Impact of Invasive Species to Wildlife Services' Cooperators*, 21 HUM. CONFLICTS WITH WILDLIFE: ECON. CONSIDERATIONS 169, 169 (2000).

2. Corey J. A. Bradshaw et al., *Massive Yet Grossly Underestimated Global Costs of Invasive Insects*, 7 NATURE COMMUN. 1, 2 (2016).

3. Dean R. Paini et al., *Global Threat to Agriculture from Invasive Species*, 113 PNAS 7575, 7575 (2016).

4. David Pimentel et al., *Update on the Environmental and Economic Costs Associated with Alien-Invasive Species in the United States*, 52 ECOLOGICAL ECON. 273, 279 (2005).

5. Richard N. Mack et al., *Biotic Invasions: Causes, Epidemiology, Global Consequences and Control*, 10 ECOLOGICAL APPLICATIONS 689, 695 (2000).

6. Petr Pyšek & David M. Richardson, *Invasive Species, Environmental Change and Management, and Health*, 35 ANN. REV. ENV'T & RES. 25, 26 (2010).

7. See Benjamin A. Jones & Shana M. McDermott, *Health Impacts of Invasive Species Through an Altered Natural Environment: Assessing Air Pollution Sinks as a Causal Pathway*, 71 ENV'T & RES. ECON. 23, 25 (2017).

8. Philip E. Hulme, *Trade, Transport and Trouble: Managing Invasive Species Pathways in an Era of Globalization*, 46 J. APPLIED ECOLOGY 10, 11 (2009).

9. Nicolas Meurisse et al., *Common Pathways by Which Non-Native Forest Insects Move Internationally and Domestically*, 92 J. PEST SCI., 13, 14 (2019).

conduits for pests, such as phytosanitary standard implementation of shipping containers and products, but these efforts have yet to alter the rate of invasive insect species spread.<sup>10</sup> Asian Longhorn Beetles, for instance, are commonly transported in wooden plant material used for packaging and wooden containers.<sup>11</sup> Since their introduction to the United States, the invasive insect species has caused over \$669 billion in damage from loss of canopy cover alone.<sup>12</sup> With difficulty in eradicating invasive insect species by way of transportation mechanisms, the introduction of new invasive insect species into the United States is inevitable.

The Southeastern United States harbors 267 million acres of forest and woodlands that are susceptible to such outbreaks.<sup>13</sup> The Southeastern United States hosts many forestry commodities, agriculturally vulnerable crops (such as avocado and citrus), and complex power dynamics between public and private landowners.<sup>14</sup> Because of these considerations, the focus of this Essay is the Southeast United States. Florida, for example, is heavily exposed to invasive species, for 85% of non-native plant shipments into the United States are through the Port of Miami.<sup>15</sup>

The Southeastern United States depends on nature-based recreation and forestland products for economic advantage.<sup>16</sup> These states have similar recreational activities, industries, and ecosystems that could be placed in peril by

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10. *Id.* at 22.

11. *Id.* at 17.

12. David J. Nowak et al., *Potential Effect of Anoplophora Glabripennis on Urban Trees in the United States*, 94 J. ECON. ENTOMOLOGY 116, 122 (2001).

13. See U.S. DEP'T OF AGRIC., U.S. FOREST RESOURCE FACTS AND HISTORICAL TRENDS 9 (Sonja N. Oswalt & W. Brad Smith eds., 2014), <https://www.srs.fs.usda.gov/products/marketing/cards/fs-1035.pdf> [<https://perma.cc/B8QV-X2UB>].

14. See generally *id.* at 7-17.

15. OFF. OF TECH. ASSESSMENT, U.S. CONG., OTA-F-565, HARMFUL NON-INDIGENOUS SPECIES IN THE UNITED STATES, at 258 (1993); see also Damian C. Adams et al., *Public Preferences for Controlling Upland Invasive Plants in State Parks: Application of a Choice Model*, 13 FOREST POL'Y & ECON. 465, 465-72 (2011) [hereinafter *Public Preferences for Controlling Upland Invasive Plants*]; Demian F. Gomez et al., *Peering into the Cuba Phytosanitary Black Box: An Institutional and Policy Analysis*, 15 PLOS ONE, no. 9, 2020, at 1, 2-3 (2020).

16. ALAN W. HODGES ET AL., ECONOMIC IMPACTS OF THE FOREST INDUSTRY IN FLORIDA, 2003, at 30 (2005); Damian C. Adams & Donna J. Lee, *Estimating the Value of Invasive Aquatic Plant Control: A Bioeconomic Analysis of 13 Public Lakes in Florida*, 39 J. AGRIC. & APPLIED ECON. 97, 97 (2007); *Public Preferences for Controlling Upland Invasive Plants*, *supra* note 15, at 465; Damian C. Adams et al., *A Bioeconomic Model for Estimating Potential Economic Damages from a Hypothetical Asian Beetle Introduced Via Future Trade with Cuba*, 22 J. BIOECONOMICS 33, 33-34 (2019) [hereinafter *A Bioeconomic Model*].

invasive species outbreaks.<sup>17</sup> A timely solution is required to prevent economic devastation by way of invasive species outbreaks. Policy intervention is one potential solution.

Policy interventions for invasive species management are used both at the federal and state level to prevent and react to potential outbreaks.<sup>18</sup> There is, however, no cohesive policy at the federal level that standardizes invasive species management in the United States.<sup>19</sup> Statutory law aims to stop importation of new species at our borders, but these laws do not address established invasive species populations.<sup>20</sup> With many gaps in policies and the slow policy-making processes utilized at the federal level, state legislation is the fastest way to obtain changes needed for protection.

At the state level, there is substantial variance in the current legal frameworks relevant to controlling invasive insect species. State boundaries are arbitrary to invasive forest insect species, which represents a weakest link issue.<sup>21</sup> If one state is more passive in its invasive insect species control, it will impact other adjacent states no matter how aggressively the other state's policies are against invasive insect species.<sup>22</sup> Policy coherence—or the compatibility of policies—can be analyzed to understand how different policies provide stakeholders with guidelines for desired behaviors.<sup>23</sup> Analyzing the policy coherence of inter- and intra-state invasive insect species is an appropriate method to evaluate the effectiveness of invasive insect outbreaks and prevention between state boundaries.<sup>24</sup>

Our analysis focuses on the policy coherence and deficiencies of state statutes regarding invasive insect species, and how they impact how states manage

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17. Adams & Lee, *supra* note 16, at 97; *Public Preferences for Controlling Upland Invasive Plants*, *supra* note 15, at 465; *A Bioeconomic Model*, *supra* note 16, at 33-34; Damian C. Adams et al., *Federal Invasive Alien Species Policy: Incremental Approaches and the Promise of Comprehensive Reform*, 23 *DRAKE J. AGRIC. L.* 291, 292 (2018) [hereinafter *Federal Invasive Alien Species Policy*].

18. *Federal Invasive Alien Species Policy*, *supra* note 17, at 294.

19. *Id.* at 292.

20. *Id.* at 294.

21. See Charles Perrings et al., *Biological Invasion Risks and the Public Good: An Economic Perspective*, 6 *CONSERVATION ECOLOGY*, no. 1, 2002, at 1, 4.

22. See *id.*

23. Marika Makkonen et al., *Policy Coherence in Climate Change Mitigation: An Ecosystem Service Approach to Forests as Carbon Sinks and Bioenergy Sources*, 50 *FOREST POL'Y & ECON.* 153, 154 (2015).

24. See *id.*

and prevent outbreaks.<sup>25</sup> This Essay argues that strong, coherent policies promoting preventative approaches to invasive species control benefits state economies, public and private landowners, and increase food security by protecting agricultural crops and forestry commodities. The following five sections begin with a summarized discussion of invasive insect species policies within each states' formal statutes. Next, broad overarching themes are identified and explored. Then, proactive and active policy outputs in invasive species management are identified. Following this, the presence of policies across the 13 states that are effective in managing or preventing invasive insect species outbreaks are specified. Finally, a proactive-reactive policy matrix is created.

## II. SUMMARY OF STATE STATUTES

In total, 13 states' statutes regarding invasive insect species management are herein summarized to uncover similarities and differences among them. These states are Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia. State statute summaries are compiled specifically to invasive insect species, using both publicly available databases and proprietary sources Westlaw and Lexis-Nexis with keyword searches (keywords: invasive, alien, non-native, exotic, and pest) and cross-referenced statutory language. If statutes did not specifically speak to insect species, general invasive species statutes are used.

The total summarized state statute list is used to create a policy coherence framework, based on proactive and active policy outputs. Policy coherence between states is revealed in policy instruments, plans, and programs.<sup>26</sup> Because proactive and active policies are ideal in the prevention of invasive insect species,<sup>27</sup> these policies are highlighted as present or absent within each state. The state statute summaries are coded thematically to find proactive and active policy outputs, which are described below.

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25. *See generally id.*

26. *See id.*

27. *See* Aliza Fleischer et al., *A Proactive Approach for Assessing Alternative Management Programs for an Invasive Alien Pollinator Species*, 88 *ECOLOGICAL ECON.* 126, 126 (2013).

### III. POLICY COHERENCE FRAMEWORK

As just discussed, and to create a policy coherence framework, the state statute summaries are coded and organized into proactive and active policy themes. Proactive management is defined as the treatment of an uninfected land area in a way that promotes a healthier ecosystem that is less vulnerable to invasive species.<sup>28</sup> On the opposite side, reactive management approach is defined as eradicating an invasive species that has already been established in the area.<sup>29</sup> Both proactive and reactive management types can be either active or passive. Active management means that the area is being continuously and aggressively treated to eliminate the invasive species as quickly and efficiently as possible.<sup>30</sup> Active management includes habitat alterations, biological control, allocation of resources, and preventative measures to protect an area from invasion.<sup>31</sup> Passive management means that minimal effort is taken to eliminate an invasive species from the site.<sup>32</sup> Proactive-active policies are ideal in invasive insect species prevention, but unfortunately are often not adopted due to high costs and organizational capacities of those involved.<sup>33</sup>

Policy coherence analysis can be subjective. To minimize subjectivity, measures were taken in this analysis to diminish bias as much as possible. State statutes regarding invasive insect species are specific enough to analyze in terms of institutional responsibility, guidelines, plans, and other factors to reduce subjectivity.

#### *A. Exploratory Coding for State Statute Summaries*

Content analysis of all state statutes was conducted to understand and explore initial commonalities amongst the states' invasive insect policies, independent of proactive and active policies. The content analysis produced commonalities in the following categories as are shown in Table 1: (1) access to property; (2) control zones/quarantines; (3) instructions for department, agency, or

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28. See CRAIG A. BOND ET AL., AAEA ANNUAL MEETING, SELECTED PAPER 11633, PROACTIVE OR REACTIVE? OPTIMAL MANAGEMENT OF AN INVASIVE FOREST PEST IN A SPATIAL FRAMEWORK 16 (2010), [https://www.fs.fed.us/rm/pubs\\_journals/2010/rmrs\\_2010\\_bond\\_c001.pdf](https://www.fs.fed.us/rm/pubs_journals/2010/rmrs_2010_bond_c001.pdf) [<https://perma.cc/3BWT-57BH>].

29. See *id.* at 3.

30. See Fleischer et al., *supra* note 27, at 126.

31. See Kirsten M. Prior et al., *When Does Invasive Species Removal Lead to Ecological Recovery? Implications for Management Success*, 20 *BIOLOGICAL INVASIONS* 267, 277 (2018).

32. Michael Drescher et al., *An Investigation of the Effects of Conservation Incentive Programs on Management of Invasive Species by Private Landowners*, *CONSERVATION SCI. & PRAC.*, May 2019, at 1, 10.

33. Fleischer et al., *supra* note 27, at 126.

official; (4) landowner actions; (5) penalties; (6) permits and certifications; prevention of transportation; and (7) funding allocations. These results indicate how often each category was mentioned within the state statutes, if at all.

*Table 1.* Exploratory content analysis results of state statutes and invasive species management.

State	Access property	Control zones/quarantine	Instructions for Department /Agency/ Official	Landowner actions	Penalties	Permits/Certifications	Prevention of transportation	Funding	Total
Ala.	1	4	5	2	1	1	1	1	16
Va.	2	2	3	2	0	1	3	1	14
Ark.	1	1	3	1	2	1	2	1	12
Ky.	2	2	5	1	1	0	1	1	13
S.C.	1	3	5	1	1	0	0	1	12
Mo.	1	1	3	1	1	1	1	2	11
Ga.	1	1	3	1	2	1	0	1	10
La.	2	1	3	1	1	1	1	0	10
N.C.	2	2	3	2	0	1	0	0	10
Tenn.	1	1	3	1	1	1	0	2	10
Tex.	1	0	4	4	0	0	0	0	9
Fla.	0	0	0	2	2	2	1	0	7
Okla.	1	1	1	1	1	0	0	0	5



The first category, access to property, refers to private landowners.<sup>34</sup> Many private landowners make up the agricultural sector and are required to temporarily relinquish management of their property in order to prevent further spread of invasive insect species.<sup>35</sup> Landowner actions describe the steps private landowners must take to notify and manage invasive insect species if present on their lands. These include control zones, quarantines, timing to notify responsible institutions, and guidelines of managing infected resources.<sup>36</sup>

Control zones and quarantines refer to the responsibility of institutions tasked with invasive insect management to compartmentalize zones that are impacted or prone to impact from invasive insects. Instructions for departments and agencies refers to specific guidelines or protocols created by said department or agency to eradicate or prevent invasive insect species. These instructions can include plans such as resource allocation, emergency protocols, and methods of control.<sup>37</sup>

Penalties involve negative incentives in the form of fines, fees, and legal action regarding the movement, transport, and failure to disclose potential conduits or invasive insect species outbreaks. Penalties are dealt to landowners, agricultural producers, and transport agencies. Permits and certifications are the required documentation for certain persons to move, ship, or transport susceptible material within and across state boundaries. These permits and certifications relate to transport of conduits, such as firewood, live plants, produce, and wooden transport materials. This section also requires vulnerable industries, such as plant nurseries or agricultural entities, to enlist in permit or certification programs that increase knowledge on how to prevent translocation of invasive insect species.

Alabama mentions state statutes related to invasive insect species management 16 times, whereas Oklahoma mentions them five times.<sup>38</sup> When looking at the number of statutes mentioned, it is important to note discrepancies amongst the number of statutes and proximities of the states. These discrepancies amongst the number of statutes and proximities of the states provide insight into the potential policy incoherence amongst states. For example, Florida statutes do not mention implementation of control zones/quarantines or access to private

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34. *See supra* Table 1.

35. *See, e.g.*, ARK. CODE ANN. § 2-16-211(b) (2021).

36. *See, e.g.*, FLA. STAT. § 581.091 (2021).

37. *See, e.g.*, ALA. CODE § 9-13-121 (2021).

38. *See supra* Table 1.

property.<sup>39</sup> Whereas Georgia's statutes refer to both of these categories.<sup>40</sup> Most of the land in central Florida—which is vulnerable to infestation—is privately owned.<sup>41</sup> If Florida experienced a severe invasive insect outbreak on private lands and the landowner did not act or publicly notify the responsible managing institution, then Georgia would be susceptible to the pest invasion, regardless of how effective Georgia's legislature attempts to make its statutes. Since there is no way to assess whether these policy outputs are proactive or active, further analysis was conducted.

### *B. Identification of Proactive and Reactive Policy Outputs*

Content analysis was used to find proactive themes, and themes were supported with literature to support the proactive-active policy coherence matrix created in the study. Six broad proactive policy themes were created: specific instruction, harsh penalties, specific official responsibility, specific fund allocation, department/agency control of outbreaks, and cooperative interstate agreements.

#### *1. Specific Instruction (Proactive) Versus Broad Instruction (Reactive)*

Specific instruction states have detailed guidelines and plans for how to carry out invasive insect species outbreaks and may even be species specific.<sup>42</sup> In contrast, broad instruction states do not provide detailed instructions on how to defend against invasive insect species.<sup>43</sup> This framework gives the respective department or institution tasked with invasive species management the flexibility to manage the invasive species as they see fit, which can result in synergy across institutions and stakeholders.<sup>44</sup> However, when there is a lack of relevant, specific protocols for preventing and reacting to invasive insect species outbreaks,

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39. *See id.*

40. *See* GA. CODE ANN. §§ 2-7-9, -10, -12 (2021).

41. KRISTINA SERVESOFF-KING, THE NATURE CONSERVANCY, CENTRAL FLORIDA LYGODIUM STRATEGY: A REGIONAL APPROACH 18 (2006), <https://www.se-eppc.org/wildlandweeds/pdf/Spring2006-Serbesoff-King-pp18-21.pdf> [<https://perma.cc/839F-7DA9>].

42. *See infra* Table 2.

43. *See id.*

44. *See* Diane L. Larsen et al., *A Framework for Sustainable Invasive Species Management: Environmental, Social and Economic Objectives*, 92 J. ENV'T MGMT. 14, 16 (2011).

mitigation efforts suffer.<sup>45</sup> Policy outputs that have specific instructions for invasive species management are proactive policy approaches.<sup>46</sup>

### *2. Harsh Penalties (Proactive) Versus Lenient Penalties (Reactive)*

Fines and penalties are intended to disincentivize and discourage unwanted behaviors, and are commonly implemented in federal, state, and local legal systems.<sup>47</sup> The type and degree of penalty are, arguably, the most important factors in proactively managing invasive insect species. Harsh penalties may include criminal charges punishable by imprisonment. Lenient penalties, in contrast, include fines and citations. Harsh penalties are ideal for imposing a proactive, active invasive insect management regime because they are more likely to ensure preventative measures are taken before the transport of an invasive species.

### *3. Specific Funds (Proactive) Versus General Funds (Reactive)*

Specific funds are resources that are directly collected into a commission or agency, which, in turn, is solely responsible for preventing or eradicating invasive forest insect species. Comparatively, general funds are typically given to a department or individual who has multiple duties and responsibilities—one of which is to manage invasive species. General funds are not ideal for invasive forest insect species management because such funds may be utilized for non-invasive-species-management-related activities. Additionally, general funds are rarely uniform and consistent because the amount of funding a department receives may vary from year to year.<sup>48</sup> For these reasons, specific funds are ideal for the management of invasive insect species.<sup>49</sup>

Specific funds—usually coupled with specific eradication projects—are a viable way to both prevent and react to invasive insect species outbreaks. Specific, well-defined funding for projects regarding invasive insect species management can increase coordination of agencies and knowledge across institutions.<sup>50</sup>

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45. See C.S. Kim et al., *Prevention or Control: Optimal Government Policies for Invasive Species Management*, 35 AGRIC. & RES. ECON. REV. 29, 39 (2006).

46. See Larsen et al., *supra* note 45, at 20; see *infra* Table 2.

47. Surabhi Kadambe & Kathleen Segerson, *On the Role of Fines as an Environmental Enforcement Tool*, 41 J. ENV'T PLAN. & MGMT. 217, 292 (1998); see also A. Mitchell Polinsky & Daniel L. Rubinfeld, *A Model of Optimal Fines for Repeat Offenders*, 46 J. PUB. ECON. 291, 292 (1991).

48. Larsen et al., *supra* note 45, at 14.

49. See *id.*

50. See *id.*

#### 4. *Specific Official (Proactive) Versus General Department (Reactive)*

A state may appoint a specific individual to achieve an agricultural policy goal.<sup>51</sup> For example, a state may appoint an expert (such as an entomologist), and this individual will then be responsible for creating management plans and overseeing the prevention and eradication of invasive insect species in the state. The state may also make an entire department (such as the Department of Agriculture and Consumer Services) responsible for invasive species management in conjunction with their other responsibilities.<sup>52</sup>

Selecting a specific official is, in the present authors' opinion, the best way to achieve a proactive management plan. Such an official is generally going to be the most knowledgeable person regarding invasive species and is typically given the resources necessary to deal with the species.<sup>53</sup> An expert in the field should be aware of preventative measures against invasive insect species outbreaks and can therefore provide specific management plans in the event of an outbreak. Two out of three case studies for sustainable invasive species management had greater success with achieving proactive measures against invasive species with specific experts, rather than organizations whose employees are given multiple responsibilities.<sup>54</sup>

#### 5. *Department/Agency/Official Control (Proactive) Versus Landowner Control (Reactive)*

Department control, or sometimes referred to as agency or official control, refers to the primary entity the state employs to control invasive insect species.<sup>55</sup> The entity is fully responsible for the prevention and eradication of the invasive insects, alongside the costs associated with surveys, investigations, and eradication methods.<sup>56</sup> Landowner control refers to when a state depends on private landowners to eradicate and take preventative methods against invasive insect species.<sup>57</sup> The landowners may be compensated, or the costs may be solely

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51. MEG FILBEY ET AL., ENV'T L. INST., HALTING THE INVASION: STATE TOOLS FOR INVASIVE SPECIES MANAGEMENT 84 (2002).

52. *See id.* at 83.

53. *See id.* at 96.

54. *See* Larsen et al., *supra* note 45, at 14.

55. *See* Peter J. May et al., *Policy Coherence and Policy Domains*, 34 POL'Y STUD. J. 381, 381 (2006).

56. *See id.*

57. *See generally* Drescher et. al, *supra* note 33, at 2.

appropriated to them.<sup>58</sup> To promote a more proactive approach, the primary entity (i.e., the department, agency, or official) should be solely responsible for eradication of invasive species, with help from landowners. This statement is generally supported by the bureaucratic and rationalization theory proposed by Max Weber, wherein the most efficient, economical, and successful policies and actions stem from management at higher institutions.<sup>59</sup>

Private landowners—even when participating in conservation incentive programs to eradicate their lands from invasive species—are less likely to engage in preventative environmental behaviors.<sup>60</sup> Private landowners often lack the time, resources, and knowledge to conduct control processes and utilize certain land use practices (such as diversifying crop species or using chemical controls) that either fully eradicate existing invasive insect species or prevent them from invading their lands.<sup>61</sup> Thus, if the landowner fails to act after notice is given by the primary entity, then the program's department, agency, or official should be permitted to access the property to begin eradication measures.<sup>62</sup>

#### *6. Cooperative Agreement Allowance (Proactive)*

Cooperative interstate agreement allowance refers to state legislation allowing the primary entity responsible for invasive forest insect control to participate in interstate agreements. Interstate agreements provide emergency resource aid to states under the agreement that have an invasive insect outbreak.<sup>63</sup> The cooperative agreement allowance also allows the states to enter into federal agency agreements—such as with the Environmental Protection Agency—for additional resources and funding.<sup>64</sup> This theme does not have a reciprocal reactive policy output because of the nature of the cooperative agreement allowance. For example, an intrastate cooperation agreement allows the entity that controls invasive insect species to enter into agreements with other organizations within the state.<sup>65</sup> They do not, however, discuss cooperation between state lines.<sup>66</sup> It is still

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58. *See id.* at 3.

59. *See* Richard A. Hilbert, *Bureaucracy as Belief, Rationalization as Repair: Max Weber in a Post-Functionalist Age*, 5 SOCIO. THEORY 70, 71 (1987).

60. Drescher et al., *supra* note 33, at 3, 9.

61. *See generally id.* at 3.

62. *See generally id.*

63. *See* FILBEY ET AL., *supra* note 52, at 74.

64. *See id.* at 37.

65. *Id.* at 84.

66. *See id.* at 23.

a proactive measure for a state to employ an intrastate cooperation agreement because collaboration for prevention of outbreaks is still occurring.

At the international and federal level, effective invasive species management occurs with cooperative efforts across a variety of different policy levels.<sup>67</sup> Cooperative interstate agreements are the proactive, ideal policy output because these kinds of agreements allow states to create protocols for aid during outbreaks, and to collaborate on prevention protocols such as regional transportation policies.<sup>68</sup>

### *C. Identification of Active Policy Outputs*

Content analysis of active policy outputs produced commonalities in the following categories: (1) introduction and movement policies; (2) shipping and transportation guidelines; (3) policy acts for invasive insect species; (4) compensation of costs to landowners; (5) quarantines and control zones; (6) forestry department involvement; (7) public notification; and (8) creation of specific committees and councils related to invasive insect species.

Acts for invasive species refer to additional legislation that allocates resources and aid to invasive species management. Depending on the severity of the invasive species, these policies may be species specific. Most acts of this nature appear at the federal level—such as the National Invasive Species Act—but some states implement their own policies because of experience with these types of invasive species outbreaks.<sup>69</sup> Compensating the landowner occurs after an invasive species outbreak, as this compensation is for damages or appropriate eradication measures that were taken on by the landowner from the responsible entity for invasive species management.

Because this compensation occurs after an outbreak, it is labeled as an active policy. The department, agency, or official responsible for prevention and eradication of invasive insects can deploy quarantines or control zones around the area of an outbreak. For example, if a bark beetle was present within a private landowner's forestry stand, the invasive management department may quarantine the entire premises regardless of the landowners' actions.

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67. See generally Charles Perrings, et al., *International Cooperation in the Solution to Trade-Related Invasive Species Risks*, 1195 ANNALS OF THE N.Y. ACAD. OF SCI., 199, 198–212 (2010).

68. See *id.*

69. See National Invasive Species Act of 1996, 16 U.S.C. §§ 4701-4751.

The state can employ their forest service as the primary department or allocate responsibility to the forest service for, among other duties, dispensing information, educating the public, and inspecting timber losses. South Carolina, for instance, deploys their forest service with resources in order to quarantine lands, conduct research, and aid in eradication efforts after an invasive species outbreak.<sup>70</sup> Public notification includes bulletins, articles, or other means of public notice to inform their constituents about the invasive species outbreak. Committees or councils can be created either through state statutes that are separate or within the department, agency, or official institution. These groups are pivotal to the development of statewide management plans.<sup>71</sup> It is presently unknown whether the plans are for eradication or prevention procedures. These councils may consist of non-governmental organizations, government organizations, or other public and private groups.<sup>72</sup> The most common type of state-level councils are noxious weed or pest plant councils.<sup>73</sup>

#### IV. PROACTIVE AND ACTIVE POLICY OUTPUTS BY STATE

Each state statute summary was coded for each state against the proactive themes identified above, for presence or absence. The results, as shown in Table 2, indicate that Alabama, South Carolina, Tennessee, and Mississippi contain the most proactive invasive insect species policies.<sup>74</sup> Florida, Georgia, and Oklahoma have the least amount of proactive invasive insect species policies.<sup>75</sup> Specifically, Oklahoma does not present any proactive categories in its state statute summary.<sup>76</sup> It should be noted that these results pertain only to state statutes.

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70. See S.C. CODE ANN. § 48-29-40 (2021).

71. FILBEY ET AL., *supra* note 52, at 84.

72. *Id.* at 83.

73. *Id.* at 85.

74. See ALA. CODE § 2-25-4 (2021); S.C. CODE ANN. § 48-29-40 (2021); TENN. CODE ANN. § 43-6-106 (2021); MISS. CODE ANN. § 69-25-9 (2021).

75. See generally FLA. STAT. § 581.083 (2021); GA. CODE ANN. § 2-7-9 (2021); OKLA. STAT. tit. 2, § 3-32.2 (2021).

76. See OKLA. STAT. tit. 2, § 3-32.2 (2021).

Table 2. Proactive policy outputs for state statutes regarding invasive species management.

		AL	SC	TN	MS	LA	VA	NC	KY	AK	TX	FL	GA	OK
<i>Proactive</i>														
	Specific instruction	X	X	X	X	X	X			X	X		X	
	Harsh penalties	X	X	X	X	X		X		X		X		
	Specific official	X	X	X	X	X	X	X					X	
	Specific funds	X							X	X				
	Department/agency control		X	X	X	X	X		X		X	X		
	Cooperative interstate agreement	X	X	X	X	X	X	X	X		X			
	TOTAL	5	5	5	5	5	4	3	3	3	3	2	2	0

Variability of policy coherence exists across all states, independent of geographical proximity. However, uniformity of proactive policies exists in the states that are more proactive. For instance, Tennessee, Mississippi, and Louisiana have the same number and type of proactive invasive insect policies.<sup>77</sup> No other states exhibit exact similarities. Most states participate in cooperative interstate agreements and have specific instructions for institutions responsible for invasive species management to eradicate and prevent outbreaks.<sup>78</sup> Specific funds were a proactive policy output that most states—aside from Alabama, Kentucky, and Arkansas—do not participate in.<sup>79</sup> This finding means that specific funds for

77. See TENN. CODE ANN. § 43-6-106 (2021); MISS CODE ANN. § 69-25-9 (2021); MISS. CODE ANN. § 69-25-15 (2021); LA. STAT. ANN. § 3:1654 (2021).

78. See *supra* Table 2; FILBEY ET AL., *supra* note 52, at 37.

79. See *supra* Table 2; see also e.g., ALA. CODE § 9-13-126 (2021); ARK. CODE § 2-16-211 (2021); KY. REV. STAT. § 249.990 (2021).



invasive insect species are not explicitly stated in state statutes, leaving room for a variety of explanations. Specific funds for invasive species management could be in the jurisdiction of departments, agencies, or officials to obtain, which is not necessarily written into state statutes.

In terms of active policy outputs, Mississippi, Louisiana, and Alabama have the most.<sup>80</sup> The states with the lowest number of active policies include Florida, Oklahoma, Texas, and Arkansas.<sup>81</sup> These results coincide with the proactive policy output results, for states with proactive outputs tend to have more active outputs and vice versa. The exception is Georgia, which has minimal proactive outputs,<sup>82</sup> but substantial active policies.<sup>83</sup> This exception illustrates that while Georgia has policies in place for invasive insect outbreaks, it still does not have much policy investment in outbreak prevention. The least common active outputs include acts for invasive species and specific committees/councils on invasive species management.<sup>84</sup> Again, these results are derived from state statutes, meaning specific committees can be formed independent from statutory law. The efficacy of such committees and acts written into statutes as compared to those that are not is disputable.

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80. *See infra* Table 3.

81. *See id.*

82. *See supra* Table 2; *infra* Table 3

83. *See infra* Table 3.

84. *See id.*

Table 3. Active policy coherence across state statutes for invasive species management.

		MS	LA	SC	AL	VA	GA	NC	KY	TN	AK	TX	OK	FL
<i>Active</i>														
	Introduction/ Movement Policies	X	X	X	X	X	X	X	X					X
	Shipping/ Transportation	X	X	X	X			X			X			X
	Acts for invasive species						X			X	X			
	Compensation of costs	X	X	X	X	X	X		X	X		X	X	
	Quarantines/ Control zones	X	X		X	X	X	X	X	X	X			
	Forestry involvement	X		X	X			X		X		X	X	
	Public notification	X	X			X			X			X	X	
	Specific committees/ councils		X	X	X	X	X							X
	TOTAL	6	6	5	6	5	5	4	4	4	3	3	3	3

#### V. PROACTIVE-ACTIVE POLICY COHERENCE MATRIX

Based on the review of proactive and active invasive insect species state statutes, each state in the study was placed into a proactive-active management matrix. This matrix helps conceptualize how policy coherence differs across geographical contexts by graphing the presence of proactive (labeled on the x-axis) and active (labeled on the y-axis) policy outputs.

Oklahoma appears as an outlier and has the least proactive-active policies.<sup>85</sup> Two vivid clusters appear in Figure 1: (1) an upper proactive-active group (Alabama, Mississippi, Louisiana, South Carolina, Tennessee, and Virginia); and (2) a moderate proactive-active group (Georgia, Florida, North Carolina, Kentucky, Arkansas, and Texas).<sup>86</sup>

85. See *infra* Figure 1.

86. See *id.*

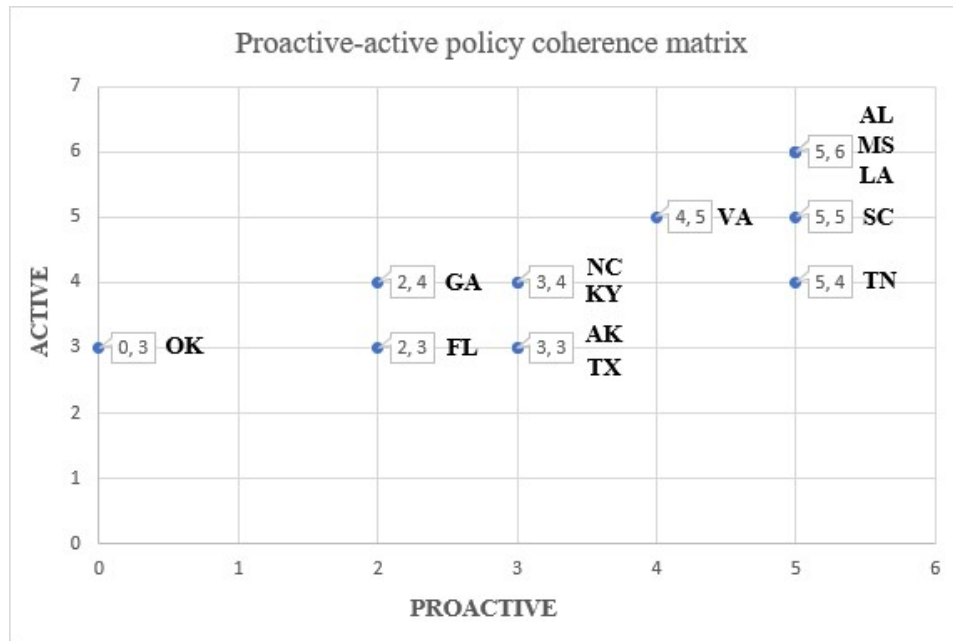


Figure 1. Proactive-active policy coherence matrix

*A. Alabama, Mississippi, Louisiana, South Carolina, Tennessee, and Virginia Have Progressive Proactive-active Invasive Species Policy.*

Alabama is unique in that it employs both the state forester and the commissioner of agriculture and industries for invasive forest insect control.<sup>87</sup> With two officials overseeing management procedures, the resources and knowledge-base that Alabama has for invasive forest insect control increases. Alabama has a specific fund created by the state treasury called the Control of Forest Tree Insects and Diseases Fund.<sup>88</sup> This fund appropriates money solely to invasive forest insect control, which no other state within this study implemented.<sup>89</sup>

South Carolina created a state crop pest commission responsible for preventing the introduction into or the spreading of introduced forest pests in the

87. See ALA. CODE §§ 2-25-4, 9-13-121 (2021).

88. *Id.* § 9-13-126.

89. *Id.*

state.<sup>90</sup> This commission works alongside the state commission of forestry to investigate, create control zones, and take any necessary measures to control forest pests.<sup>91</sup> No other state in this study has created a state crop pest commission that also implements a state entomologist and state plant pathologist.<sup>92</sup> With these knowledgeable officials at play, South Carolina does not need to—nor does it—depend on landowners to take preventative and eradication measures related to invasive forest insects.<sup>93</sup>

Virginia is another unique state because it created the Secretaries of Natural Resources, an advisory group that develops an invasive species management plan, coordinates with other entities, and implements that plan.<sup>94</sup> Virginia’s legislation surrounding invasive forest insect species is specific—especially regarding quarantined areas—the commissioner’s duties and rights, and the powers of the Secretaries of Natural Resources.<sup>95</sup> Virginia, similarly to South Carolina, does not depend on landowners to take individualized action to control invasive forest insect species.<sup>96</sup> The state takes proactive approaches on the introduction of invasive pest species into the state, and the Secretaries of Natural Resources take “strategic actions” related to invasive species for prevention, early detection, rapid response, control and management, research and risk assessment, and education and outreach.<sup>97</sup>

Mississippi’s legislation establishes a close relationship between the commissioner of agriculture—the primary entity responsible for invasive species control in the state—and Mississippi State University of Agriculture and Applied Science.<sup>98</sup> The commissioner must appoint a full-time director at the University to be the director of the bureau of plant industry.<sup>99</sup> This legislation is unique because it employs an individual from Mississippi State University to stay up to date on knowledge and techniques regarding invasive species control, which is beneficial

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90. S.C. CODE ANN. § 48-29-20 (2021).

91. *Id.* § 48-29-40.

92. *Id.* § 46-9-20.

93. *See* S.C. CODE ANN. § 48-29-20 (2021).

94. VA. CODE ANN. § 2.2-220.2(B) (2021).

95. *See id.* §§ 2.2-220.2(B), 3.2-701-3.2-707.

96. *See id.* § 2.2-220.2(B).

97. *Id.* § 2.2-220.2(A)-(B).

98. *See* MISS. CODE ANN. § 69-25-5 (2021).

99. *Id.*

to the commissioner as they can receive active recommendations from the director of the bureau of plant industry (a proactive approach).<sup>100</sup>

The primary entity responsible for invasive insect control in Louisiana is the commissioner of agriculture and forestry (who also works in tandem with the state entomologist), both of whom are employed by the department of agriculture and forestry.<sup>101</sup> This partnership is considered an active approach because the state entomologist has the most responsibility and duty to investigate, eradicate, prevent, and make rules and regulations regarding invasive forest insects.<sup>102</sup> Further, the state entomologist: (1) has the ability to enter any infected property; (2) the power to investigate, prevent, and eradicate any invasive forest pests as deemed necessary; (3) issue active public notices of any present invasive pest; and (4) the authority to regulate shipping into and out of the state with regard to plant pest or disease.<sup>103</sup>

Tennessee created the Plant Pest Act, which gives the full authority and responsibility of invasive forest insect control to the commissioner of agriculture.<sup>104</sup> By far, Tennessee's legislature has the most specific instructions regarding the commissioner of agriculture's duties and responsibilities as compared to any other state in the study.<sup>105</sup> Tennessee's division of forestry is a secondary entity that aids in invasive forest insect control, and:

[H]as been protecting, conserving, and enhancing our state's forest resources for over 100 years. The Tennessee [d]ivision of [f]orestry extinguishes 1,000 fires that burn 20,000 acres each year and helps control the disease and insect pests that plague [Tennessee's] forests.<sup>106</sup>

This dynamic, bilateral department is unique to Tennessee and provides both the state and local localities with monetary provisions and the resources necessary to tackle any approaching insect pest threat or eradicating one that is already

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100. *See id.* § 69-25-11.

101. *See* LA. STAT. ANN. §§ 3:1652, 3:1654 (2021).

102. *See id.* § 3:1654.

103. *See* LA. ADMIN. CODE tit. 7, §§ 105, 107, 109 (2021); *see also* LA. STAT. ANN. §§ 3:1652, 3:1654 (2021).

104. TENN. CODE ANN. § 43-6-110 (2021).

105. *See id.* §§ 43-6-106, -107, -110.

106. 1. *What Does the Division of Forestry Do?*, Answer to *FAQ*, TENN. DEP'T OF AGRIC. (Oct. 14, 2021, 8:54 AM), <https://www.tn.gov/agriculture/forests/faq.html> [<https://perma.cc/9Z5Q-2GZ3>].

present. However, Tennessee remains passive because of its lack of transportation and movement policies that can impact policy coherence between states.

Georgia's statutes regarding the control of invasive forest insects revolve around the eradication of pests rather than preventing them.<sup>107</sup> The state is part of the Pest Control Compact, and has also implemented the Entomology Act of 1937, which further regulates plant pests (an active approach).<sup>108</sup> The legislature lacks discussion of any special funds or funds specifically assigned to invasive species management; therefore, the commissioner uses funding from the department of agriculture's general funds.<sup>109</sup> Georgia's legislative framework does not support interstate cooperative agreements on invasive forest insect control, which can prevent the state from receiving any additional resources needed for emergency outbreak control.<sup>110</sup>

*B. Florida, North Carolina, Kentucky, Arkansas, Texas, and Oklahoma Have Moderate Proactive-active Invasive Species Policy*

Florida was placed in a reactive-passive category, with a heavy emphasis on a passive invasive insect management plan. The majority of Florida's statutes regarding invasive forest insect control surround shipping mandates and introduction of pests into the states.<sup>111</sup> The summary of statutes regarding invasive forest insect species management of Florida did not specify the primary entity's ability to enter interstate cooperative agreements, which could really hurt the state if a large invasive insect outbreak occurred. Additionally, there was not enough funding or resources available to sequester the outbreak. All in all, Florida lacked extensive legal policy regarding invasive forest insect introduction and management, as compared to the other states in study.

North Carolina employs the board of agriculture and the commissioner of agriculture under their department of agriculture and consumer services to prevent, eradicate, and repress the spread of plant pests.<sup>112</sup> Despite a strong department and official influence, North Carolina does depend on landowners to control invasive forest insects.<sup>113</sup> North Carolina also relies on the division of entomology, as well

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107. See GA. CODE ANN. §§ 2-7-9, -10, -12 (2021).

108. See generally *id.* §§ 2-7-1 to -31 (2021).

109. See generally *id.*

110. See generally *id.*

111. See FLA. STAT. §§ 581.083, .091, .211 (2021); see also FLA. ADMIN. CODE ANN. r. 5B-57.004 (2021).

112. N.C. GEN. STAT. § 106-920 (2021).

113. *Id.* § 106-421.

as the state's forest service, integrated pest management, and the invasive plant council for support, funding, and knowledge.<sup>114</sup> The legislation does not contain any specific instructions or powers that any department or official may have, indicating it is a broad instruction state.

Kentucky was placed into the reactive-passive quadrant. The primary entity for invasive forest insect control is the Energy and Environment Cabinet (EEC). The EEC's secretary is tasked with conducting surveys and investigating the threat of infestations of forest pests.<sup>115</sup> The EEC works in unison with the state entomologist of Kentucky's department of entomology and the division of environmental services.<sup>116</sup> Kentucky's legislature emphasized a stronger dependence on interstate and federal agency cooperation.<sup>117</sup> To punish the violation of any article regarding invasive species, Kentucky implements a fine system, in which the fines range from twenty-five dollars to five-hundred dollars—a lenient penalty.<sup>118</sup>

Arkansas created the Arkansas Plant Act of 1917, which established a state plant board that is responsible for education, public notification, and implementation of rules and regulations regarding invasive forest insect control.<sup>119</sup> The director of the state plant board is similar to the commissioner of agriculture in other states. Arkansas also created the Arkansas Emergency Plant Act of 1921, which supplements the actions of the state plant board.<sup>120</sup> Despite the strong legislative acts that give the state plant board power to eradicate invasive forest insects, the state still depends on landowners to take measures for prevention and eradication.<sup>121</sup> Besides interstate cooperation within the Pest Control Compact,

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114. See *Invasive Plants*, N.C. FOREST SERV. (Oct. 14, 2021, 9:08 AM), [https://ncforestsservice.gov/forest\\_health/invasives.htm](https://ncforestsservice.gov/forest_health/invasives.htm) [<https://perma.cc/W49C-XJGF>]; *Monitoring Invasive Forest Pests*, N.C. FOREST SERV. (Oct. 14, 2021, 9:09 AM), [https://ncforestsservice.gov/forest\\_health/monitoring\\_invasives.htm](https://ncforestsservice.gov/forest_health/monitoring_invasives.htm) [<https://perma.cc/CJP2-A9EW>]; see generally *Integrated Pest Management*, N.C. STATE UNIV. EXTENSION (Oct. 14, 2021, 9:09 AM), <https://ipm.ces.ncsu.edu/> [<https://perma.cc/R5NA-UJG2>]; *About Us*, N.C. INVASIVE PLANT COUNCIL (Oct. 14, 2021, 9:09 AM), <http://nc-ipc.weebly.com/> [<https://perma.cc/4DQL-EF8S>].

115. KY. REV. STAT. ANN. § 149.610, .620 (2021).

116. *Id.* § 249.990.

117. *Id.* § 149.660.

118. *Id.* § 249.990.

119. ARK. CODE ANN. § 2-16-207 (2021).

120. *Id.* § 2-16-303

121. *Id.* § 2-16-211(a).

Arkansas legislation does not specify any other similar cooperative agreement allowances.

The primary entity responsible for invasive forest insect control in Texas is the Texas Forest Service.<sup>122</sup> The department relies almost entirely on landowners to take action once an invasive forest insect outbreak is detected, the landowner is given notice of the outbreak, and a control measure recommendation is provided.<sup>123</sup> Texas created an invasive species coordinating committee, which is a council that aids in informing cooperating state agencies and providing expertise behind invasive forest insect control.<sup>124</sup> Texas' legislation lacks any description of proactive approaches, such as shipping mandates, introduction of invasive species into the state, and general eradication procedures.<sup>125</sup> The state is passive in treatment because of its heavy dependence on the landowner to control any outbreak of an invasive forest insect, lack of departmental control, and no continuous, aggressive eradication methods employed by the primary entity.

Out of all the states in study, Oklahoma has the fewest legislative regulations surrounding invasive forest insect species. Oklahoma's primary entity for invasive forest insect control is the department of agriculture, food, and forestry, which receives aid from their state board of agriculture.<sup>126</sup> This department depends heavily on landowners to take measures to eradicate any invasive forest insect outbreak.<sup>127</sup> Despite shipping regulations, most of the legislation takes a reactive approach, with the primary entity reacting only when an outbreak has been identified within the state.<sup>128</sup>

## VI. POLICY COHERENCE AND NEED FOR REFORM

Analysis of statutory law for invasive insect species management depicts variability within the policy coherence among thirteen southeast states. This work builds on a related effort focused on analysis of invasive species policy at the federal level (DAMIANT),<sup>129</sup> and fills an important gap with respect to state-level policy analysis. At the federal level, no coherent policies regarding preventative invasive species policies are in place. Instead, a myriad of policies is relied upon

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122. See TEX. NAT. RES. CODE ANN. § 152.011 (West 2021).

123. *Id.* §§ 152.018, .061.

124. TEX. GOV'T CODE ANN. § 776.004 (West 2021).

125. See, e.g., TEX. NAT. RES. CODE ANN. §§ 152.018, .061 (West 2021).

126. OKLA. STAT. tit 2, §§ 3-32.2, -32.9 (2021).

127. *Id.* § 3-32.2.

128. See generally *id.*

129. *Public Preferences for Controlling Upland Invasive Plants*, *supra* note 15, at 465.



to cover invasive species management. There is unison in policy approaches among states at the statutory level, indicating the presence of horizontal policy coherence, or the coherence of policies at the same governmental level. This analysis, however, highlights important geographical gaps in policy coherence that could improve proactive invasive insect species management.

A proactive-active approach is the most economically efficient invasive insect management type as compared to a reactive-passive approach,<sup>130</sup> yet several states do not engage in this approach. The variability found in the state statute invasive species frameworks is an issue that should be addressed on a national, state, and local level. Even if a state implemented a proactive-active approach—such as Alabama—the state still faces a risk of invasion if it is located near a less proactive-active state—such as Georgia. The presence of positive horizontal policy coherence shows that the states in the region are implementing similar policy action and principles within state lines. Institutional responsibility, management plans of action, and presence of intrastate cooperation are present in each state, thus there is a possibility for improvement with policy alterations.

Coordinating a proactive-active approach means a variety of actions must take place collectively, such as coordination efforts, regulation of transport, control, and management of invasive species over the long-term, and enforcement of penalties and incentives.<sup>131</sup> Most states have the tools necessary to create rigorous preventative measures against invasive insect species but lack the coordination to promote an interstate regional force. Awareness of a state's proactive and reactive policies can start conversations about editing existing statutes, forming councils and committees across state boundaries, and even creating new statutes with firmer outlines on proactive management.

This analysis establishes the presence or absence of tools and resources states have available to them for invasive species management at the statutory level. This demonstrates the role of state governments in invasive species prevention. Invasive species' negative impacts are large enough to detract entire industries—such as agricultural production—and it is in the best interest of state governments to clarify guidelines and allocate resources at the statutory level. Understanding where states lie in terms of proactive invasive species policy is an initial step to ensuring resources and tools are available and distributed across organizations, agencies, and authorities.

The legislative processes that affect invasive species policy often lag behind the speed with which insects invade. Many legislators that oversee creation of

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130. Prior et al., *supra* note 32, at 268.

131. *Id.* at 24.

policies lack knowledge of the biology behind invasive species, which can result in regulations that do not efficiently or proactively manage invasive species. The state departments or officials that oversee invasive species management should provide economic or policy-driven rationale for proactive management of invasive insect species to their policy makers. Based on the findings of this analysis, state agencies or officials should be encouraged to participate in interstate policy programs and councils to allocate knowledge and resources for cohesive management. This study uncovered the prevalent disconnect between the human dimensions, legal complexity, and ecology of invasive species management. With ample resources, communication efforts, and education, the gap within these three silos may be merged to achieve complete policy coherence at the state level.

There is no black and white answer to policy coherence related to invasive insect species. Invasive insect species are inherently difficult to manage and detect because of their size, species type, and abundance. Cohesive, preventative methods ought to be imposed to prevent the economic, environmental, and social danger posed by invasive insects. State statutes regarding such species should be coherent across state boundaries while being sufficiently flexible to deal with the biological intricacies of invasive species, specific land use types, and the present institutional frameworks of the state. Additionally, vertical policy coherence—or alignment with federal invasive insect policies and programs—can bolster and encourage states to implement cohesive management frameworks (with proper funding) more quickly across state boundaries. This analysis aims to shed light on the discrepancies of policy coherence at the state level so as to work towards policy cohesion in the future, especially in light of the imminent rise of invasive insect species.

The policy coherence framework, created by this analysis, does not address the entirety of invasive species management, such as other agencies, councils, non-governmental organizations, and programs involved in eradicating and preventing invasive insect species outbreaks. Nevertheless, the policy coherence framework shows that the policy process at the state level can be improved. Having a summary of state statutes for invasive species management per state is a vital tool for researchers, organizations and agencies, and policy makers to address what the best method is to approach and engage in effective invasive insect species management.

## VII. CONCLUSION

This Essay contributes to the literature by summarizing current state statutes regarding invasive species management and providing a framework of analysis for policy coherence between states. The current policy coherence in the southeast poses significant geographical gaps in guidelines and procedures for state entities to follow with current and future invasive species outbreaks. Additionally, the patchwork of responsible managing agencies varies greatly from state to state, including the source and amount of funding and other resources necessary to effectively manage current outbreaks and prevent new ones. The accountability of agencies and effectiveness of management is not listed within statutes, further clouding effective management approaches or lack thereof. Steady guidance from federal policies, which encourage or even require reform at the state-level to promote policy cohesion, could promise rapid, cost-effective management of invasive insect species to protect important agricultural commodities, such as forest production. Reform at the state level could also connect and organize inter-agency cooperation with new entities not mandated in statutory law. Interstate reform has the potential to evolve into public cooperative education and engagement for preventative measures for agricultural landowners and other stakeholders.