CHAPTER 6.

2013–2027 National Insect and Disease Forest Risk Assessment: Summary and Data Access

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OVERVIEW

The 2013–2027 National Insect and Disease Forest Risk Assessment represents a nationwide strategic assessment of the hazard of tree mortality due to insects and diseases displayed as a series of maps, the National Insect and Disease Risk Maps (NIDRM) (Krist and others 2014) (figs. 6.1, 6.2, and 6.3). Risk, or more appropriately termed, *hazard*, is defined in the assessment as *the expectation that, without remediation, at least 25 percent of standing live basal area >1 inch in diameter will die over a 15-year time frame (2013–27) due to insects and diseases.*

NIDRM is more than just maps. It is a nationwide, science-based, administrative planning tool that is the product of a process whereby, every 5 years, the forest health community works together to determine the severity and extent of tree-mortality hazard due to insects and diseases. NIDRM was developed within a highly collaborative process led by the Forest Health Monitoring (FHM) Program of the Forest Service, U.S. Department of Agriculture, with participation from FHM staffs from all regions, State forestry agencies, the Forest Service's Forest Health Protection Program, and Forest Service Research and Development.

NIDRM represents 186 individual insect and disease hazard models, integrated within a common Geographic Information System-based, multicriteria framework that can account for regional variations in forest health. Applied to all 50 States, and based on the best-available science and data, NIDRM's modeling process provides a consistent, repeatable, transparent, peer-reviewed process through which interactive spatial and temporal hazard assessments can be conducted (Krist and others 2014). This process is consistent with the 2006 effort (Krist and others 2007), allowing for flexible analysis to produce hazard assessments for specific insects and diseases, and can be used to inform other agency assessments such as the Integrated Resource Restoration, Watershed Condition Framework, Terrestrial Ecosystem Condition Assessment, Existing Vegetation Classification Mapping and Inventory, and Hazardous Fuels Prioritization Allocation System.

NIDRM products are compiled on a national extent with a 240-m spatial resolution (approximately 14 acres) and can be updated as new data and/or models become available. This "live" or near-real-time approach will greatly facilitate the production of new hazard maps. This chapter provides a brief overview of NIDRM and describes how geospatial and tabular data from this 2013–27 National Insect and Disease Forest Risk Assessment can be accessed. The full report (Krist and others 2014) and associated data are available from the NIDRM Web site at http://www.fs.fed.us/foresthealth/technology/nidrm.shtml.

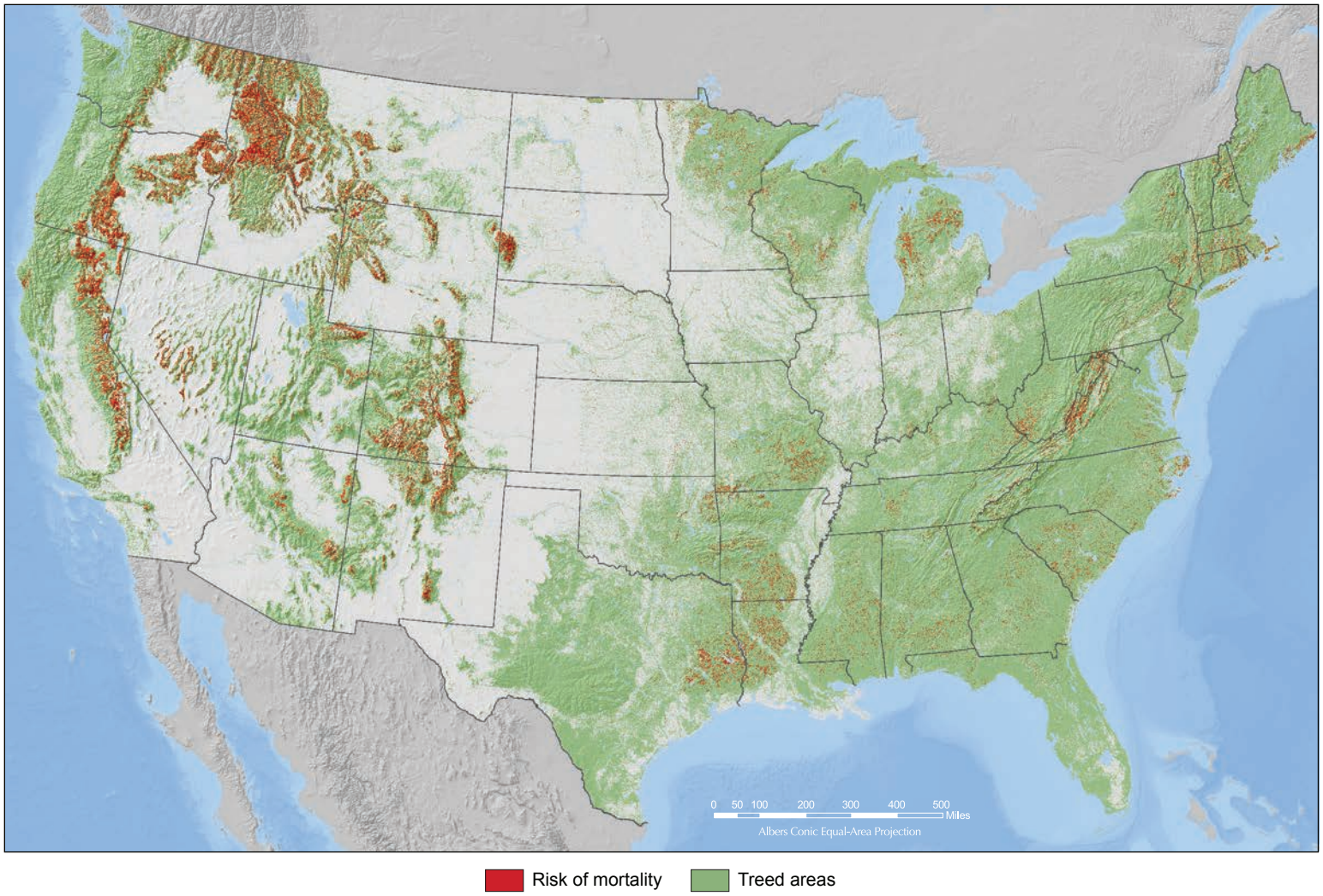

Figure 6.1—The 2013–27 national insect and disease composite risk map for the conterminous United States. Risk, or more appropriately termed, "hazard," is defined as the expectation that, without remediation, at least 25 percent of the standing live basal area >1 inch in diameter will die over a 15-year time frame (2013–27) due to insects and diseases. (Data source: U.S. Department of Agriculture Forest Service, Forest Health Protection)

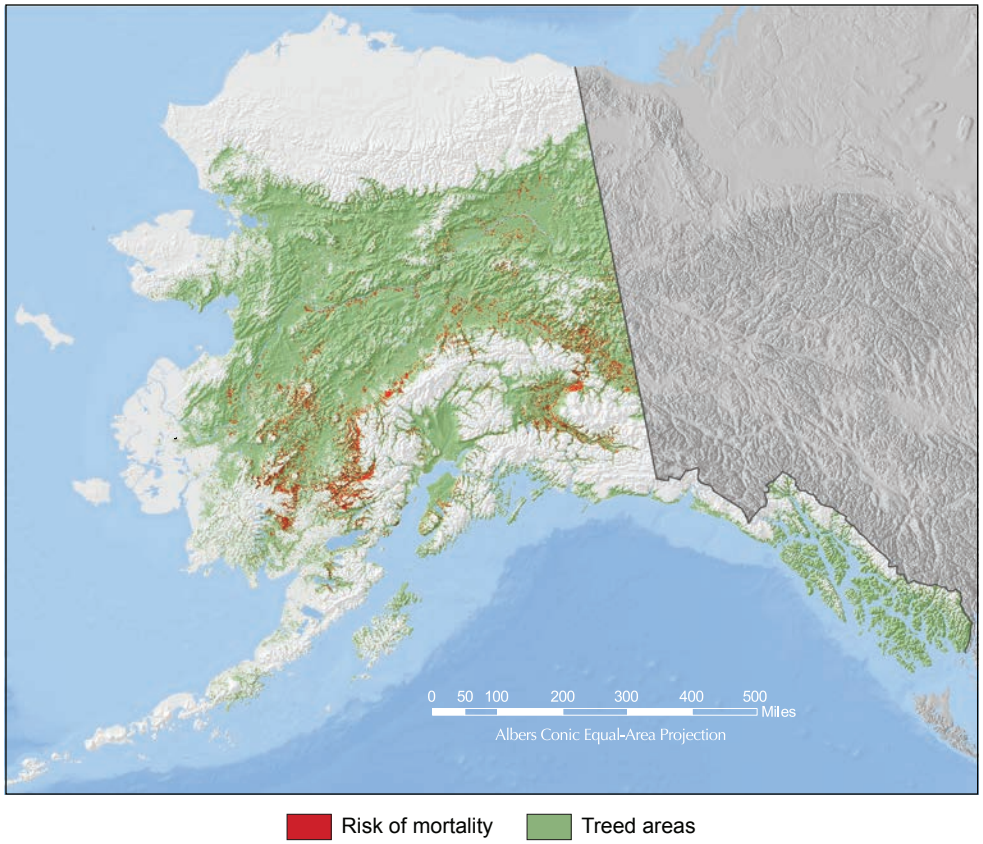

Figure 6.2—The 2013–27 national insect and disease composite risk map for Alaska. Risk, or more appropriately termed, "hazard," is defined as the expectation that, without remediation, at least 25 percent of the standing live basal area >1 inch in diameter will die over a 15-year time frame (2013–27) due to insects and diseases. (Data source: U.S. Department of Agriculture Forest Service, Forest Health Protection)

PURPOSE

NIDRM's primary purpose is as a strategic, broad-scale planning tool that can be used for administrative activities and work planning. In certain landscapes and at appropriate scales, NIDRM maps may be helpful for on-the-ground tactical management. NIDRM was included in section 8204 of the 2014 Farm Bill as an evaluation criterion for States requesting designation of landscape-scale areas to address insect or disease threats on one or more of their National forests.

DATA SOURCES AND PROCESSING

Previous NIDRM assessments (Krist and others 2007, Lewis 2002) defined forests as lands containing at least 10-percent tree canopy cover, including land that formerly had such tree cover and will be naturally or artificially regenerated. By this definition, there are approximately 749 million acres of forested land in the conterminous United States and Alaska. For the 2012 hazard assessment, we extended these limits and modeled 1.2 billion acres of *treed* land—areas of measurable tree presence—across the United States (whether or not these treed lands met some standard definition of forested) (Krist and others 2014). This approach improves coverage for rural areas of the Great Plains and urban areas nationally. The 2012 hazard assessment estimates that 81 million of these acres are in a hazardous condition for insects and diseases. Almost 72 million acres susceptible to hazard are in the conterminous United States,

and 9.5 million acres are in Alaska. In Hawaii, not previously assessed, just under a half-million acres are estimated to be in a hazardous condition. These estimates do not include hazard due to projected climate changes, although this NIDRM report includes an examination of future climate impacts on insect and disease hazards.

With significant improvements in coverage, accuracy, and precision of the data, the 2012 NIDRM was better able to model risk in the Great Plains, urban areas, National forests, and National parks. These improvements also allowed us to model pests, such as emerald ash borer (*Agrilus planipennis*) and laurel wilt, which infest rare and/or widely distributed host species.

MAJOR HAZARDS

Collectively, root diseases, bark beetles, and oak decline were the leading contributors to the risk of mortality in the conterminous United States, while spruce beetle (*Dendroctonus rufipennis*) was the most significant contributor in Alaska. The confluence of bark beetles and root diseases has resulted in large contiguous areas at risk across much of the Western United States. Emerald ash borer was the most significant exotic forest pest. Tree species with the potential to lose more than 50 percent of their host volume include redbay (*Persea borbonia*) and whitebark pine (*Pinus albicaulis*).

While future climate change is not modeled within NIDRM, we expect that the climate changes projected over the next 15 years will significantly increase the number of acres at

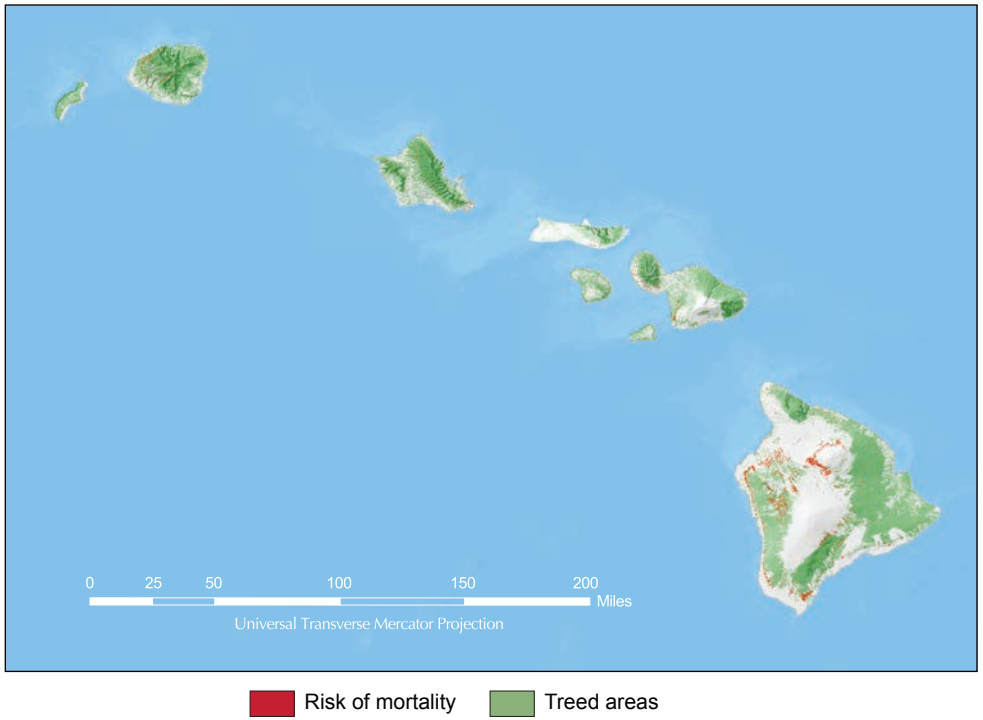

Figure 6.3—The 2013–27 national insect and disease composite risk map for the main islands of Hawaii. Risk, or more appropriately termed, "hazard," is defined as the expectation that, without remediation, at least 25 percent of the standing live basal area >1 inch in diameter will die over a 15-year time frame (2013–27) due to insects and diseases. (Data source: U.S. Department of Agriculture Forest Service, Forest Health Protection)

risk, and will include elevated risk from already highly destructive pests such as mountain pine beetle (*Dendroctonus ponderosae*) and engraver beetles (*Ips* spp.). Host trees such as whitebark pine would be at increased risk in future climate change scenarios.

DATA ACCESS

NIDRM's outputs of tabular and geospatial data can be used to:

- Identify the potential impacts of pests and pathogens to forest ecosystems throughout the United States for the 2013–27 timeframe.
- Generate forest pest and pathogen risk maps at a scale useful for resource planning and management in many of our National forests, National parks, and other local units.
- Inform ecosystem assessments and focus forest pest-management resources across geographic regions and individual pest distributions; in other words, prioritize investment for areas where both hazard is great and effective treatment can be efficiently implemented.
- Detect areas where hazardous fuel conditions coincide with forests at high risk for insect and disease activity; this analysis can maximize fire and forest health budgets because, in many cases, the same silvicultural treatments are effective for reducing both fire and pest hazards.

Access to NIDRM data is provided in three ways from the 2012 NIDRM Data Download Web site (http://www.fs.fed.us/foresthealth/technology/nidrm2012.shtml):

(1) *Tabular and geospatial data download*—Downloadable information includes tabular data that summarize results from the 2013–27 National Insect and Disease Forest Risk Assessment by National forest, National park, and sixth-level (12-digit) Hydrologic Unit Code watersheds units. Geographic Information System (GIS) data available for download include ArcINFO® GRID format raster layers depicting estimated losses from individual forest pests or pathogens, and impacts by tree species.

(2) *Direct connect to geospatial data within ArcGIS®*—Map and image Web services can be easily added to ArcGIS® and incorporated into maps. Map services provide ready-to-use layers with fixed symbology, while image services provide a wider range of flexibility such as data download, access to metadata, customizable symbology, and inputs to ArcGIS® raster analysis tools. All the GIS layers available for download are offered as map or image services. The 2012 NIDRM Data Download Web site explains how to access and use these services.

(3) *Viewing data through one of two Web applications*:

(a) 2013–27 National Insect and Disease Risk Map Viewer allows users to easily navigate the library of map services across all treed lands in the United States (http://foresthealth.fs.usda.gov/nidrm/).

(b) The Forest Health Advisory System combines pest images, tables, and an embedded map viewer to summarize the 2012 NIDRM by National forest and National park units (http://foresthealth.fs.usda.gov/fhas). The site also provides contact information for local forest health experts and publications where managers can obtain additional details on the biology and management for the insect and disease hazards identified on their unit.

LITERATURE CITED

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