READMES:
Access to programs, code and data used in "Exploring and testing wildfire risk decision-making in the face of deep uncertainty"

The DOI links below access the Harvard Dataverse repository for the programs, code and output data used in this article. The repository is organized as a nested set of datasets of which the five below live at the highest level. Below the links is a compilation of the three readme files that guide the user on how to use the repository and that provide the metadata, including descriptions of the content and organization of each dataset.

0. SWCNH Dataverse ReadMe files
Johnson, Bart, 2023, "0. SWCNH Dataverse ReadMe Files",
https://doi.org/10.7910/DVN/ELMITB, Harvard Dataverse

1. Envision Installation Package
Bolte, John, 2023, "1. Envision Installation Package"
https://doi.org/10.7910/DVN/OWAXF2, Harvard Dataverse

2. SWCNH Envision installation and use tutorials
Johnson, Bart, 2023, "2. SWCNH Envision installation and use tutorials"
https://doi.org/10.7910/DVN/PUWTBQ, Harvard Dataverse

3. Envision Fire Generator
Johnson, Bart, 2023, "3. Envision Fire Generator"
https://doi.org/10.7910/DVN/TKLWDB, Harvard Dataverse

4. SWCNH Envision canonical simulation outputs
Johnson, Bart, 2023, "4. SWCNH Envision canonical simulation outputs"
https://doi.org/10.7910/DVN/0JNJFB, Harvard Dataverse

A. SWCNH Dataverse

SWCNH_Dataverse_readme.txt
This repository is the highest level of organization. It contains the five datasets listed above, which together constitute the programs, code and output data for the collaborative research project conducted by the authors and other team members.

B. Modeling Wildfire Risk – how to access data used for outputs

2023_Modeling_Wildfire_Risk_readme.txt
This readme provides instructions on how to access the specific data used to produce each of the results presented in this article.

C. SWCNH Envision canonical simulation outputs

SWCNH_Envision_Ouputs_readme.txt
Modeling outputs were derived from 600 canonical simulation runs of the South Willamette Coupled Natural-Human Systems (SWCNH) Envision modeling system, representing 50 runs for each of 12 scenarios. The totality of model output files are provided in this dataset.

The SWCNH_Dataverse_readme.txt file was generated on 2022-05-03 by Bart R. Johnson and Cody Evers

GENERAL INFORMATION

1. Title of Dataverse: SWCNH Dataverse

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3. Dates of model output production: 2011-02-01 to 2011-02-28

4. Geographic location of study area: 81 km2 study area outside of the Eugene-Springfield metropolitan area, Oregon, USA

5. Information about funding sources that supported model development and output production:

This material is based upon work supported by the National Science Foundation under Grants No. 0816475 and 0816228 with added support from the USDA Forest Service Western Wildland Environmental Threat Assessment Center (WWETAC).

SHARING/ACCESS INFORMATION

1. Licenses/restrictions placed on the data: CC-0 (public domain). Citation requested.

2. Links to publications that cite or use the data:
Hulse, D., A. Branscomb, C. Enright, B. Johnson, C. Evers J. Bolte and A. Ager. 2016. Anticipating Surprise: using agent-based alternative futures simulation modeling to identify and map surprising fires in the Willamette Valley, Oregon U.S.A. Landscape and Urban Planning. http://dx.doi.org/10.1016/j.landurbplan.2016.05.012.

Johnson, B.R.; Ager, A.A.; Evers, C.R.; Hulse, D.W.; Nielsen-Pincus, M.; Sheehan, T.J.; Bolte, J.P. Exploring and Testing Wildfire Risk Decision-

Making in the Face of Deep Uncertainty. Fire 2023, 6, x. https://doi.org/10.3390/xxxxx

3. Link to other publicly accessible locations of the data: http://envision.bee.oregonstate.edu/StudyAreas/SouthernWillamette/ScenarioResults/ScenarioResults.htm

4. Links/relationships to ancillary data sets: none

5. Was data derived from another source? no

6. Recommended citation for this dataset:
Johnson, Bart R. John P. Bolte, David W. Hulse, Robert Ribe, Max Nielsen-Pincus and Cody R. Evers. 2011. South Willamette Envision Coupled Natural-Human Systems Simulation Model. Eugene, OR: University of Oregon.

USING THIS REPOSITORY

1. SWCNH Dataverse Content and Organization

This repository contains the programs, code and output data for the collaborative research project conducted by the authors and other team members (see Acknowledgements). It includes:

1.0 SWCNH Dataverse ReadMe files

1.1 Envision Installation package
The SWCNH Envision model requires a 64-bit Windows-based PC Environment and was run on Windows 7 and 8. The installation package includes three files:

1) The Envision Program: Setup-x64.msi
2) The Eugene study area files: EugeneInputs.msi
3) The GIS coverage for the Eugene study area: EugeneIDUs.msi

1.2 SWCNH Envision installation and use tutorials
This package contains installation instructions and user tutorials developed over a series of courses taught by Bart Johnson and Gwynne Mhuireach to University of Oregon students from 2011-2013, including Landscape Architecture Design and Planning studios, and climate adaptation courses.

1.3 Envision Fire Generator
This package contains the R script and supporting data files used to generate replicate fire lists for each scenario and run. See internal readme and appendix for more details on the methods used to generate and calibrate fire lists.

1.4 SWCNH Envision Dataset
This data set includes the totality of simulation output files produced from 600 canonical simulation runs of the South Willamette CNH (SWCNH) Envision system. The 600 alternative futures comprise 50 replicate runs of each of 12 scenarios. The 12 scenarios were created by fully crossing a set of three scenario dimensions with selected contrasts for each dimension: climate (2) x development (2) x management (3).

1.5 Current Envision Code is available on GitHub:
https://github.com/boltej/Envision

ACKNOWLEDGEMENTS

This research project and its coupled modeling system development was a collaborative effort of more than 25 researchers and students from the University of Oregon (UO), Oregon State University (OSU), and the USDA Forest Service. Bart Johnson (UO) and John Bolte (OSU) served as Principal Investigators for the US NSF-funded, multi-university collaboration "CNH: Collab Research: The Interactions of Climate Change, Land-Management Policies, and Forest Succession on Fire Hazard and Ecosystem Trajectories in the Wildland-Urban Interface". Co-PIs included David Hulse, Robert Ribe and Scott Bridgham (UO), and Ronald Neilson (OSU). Senior researchers included Alan Ager, Jane Kertis, Constance Harrington, Dominique Bachelet, Allan Branscomb, Chris Enright, Peter Gould, Max Nielsen-Pincus, James Lenihan, James Merzenich, and Alison Reger. Graduate students included Gabriel Yospin, Tim Sheehan, David Conklin, Nathan Ulrich, Cody Evers, Gwynne Mhuireach and Wu Hong. Fire Behavior calculations were produced with models developed by the Missoula Fire Sciences Laboratory, Missoula, MT. Stu Brittain modified the fire behavior code library for Envision's wildfire submodel. Michelle Day built the fire generator system and generated fire lists. Haiganoush Preisler assisted with the algorithms for fire-climate relationships. James Sulzman implemented most Envision code.

The 2023_Modeling_Wildfire_Risk_README.txt file was generated on 2022-05-03 by Bart R. Johnson and Cody Evers

GENERAL INFORMATION

This document identifies the simulation outputs used to produce results for "Modeling wildfire risk decision-making in the face of deep uncertainty" [INCLUDE FULL CITATION WHEN PUBLISHED].

All simulation results used in this paper were derived from 600 canonical simulation runs of the South Willamette CNH (SWCNH) Envision project. The totality of model output files are provided in the dataset: FireNet Dataverse/SWCNH Dataverse/Envision SWCNH canonical simulation outputs.

Detailed descriptions of the content and organization of the dataset, and how to access the specific data described below, are found in 0_SWCNH_Envision_Outputs_README.txt located in dataset's main folder.

OUTPUT FILES USED TO GENERATE RESULTS

Results for selected model runs were generated from the following output files, referenced by result type and associated figures and tables:

1. Reconstructions of annual and total area burned by fire severity, annual and total threatened residences, and %restoration treatment area (Fig. 4, Fig. 5, Table 1) were derived from Model Outputs/Model and AppVar Outputs files.

2. Area burned maps (Fig. 4) were generated from Delta Array outputs applied in a geospatial environment using the Envision IDU shapefile.

3. Largest fires (Table 1) for selected runs were produced from Firelists.

4. Annual budgets for incentivized fuels and restoration treatments (Fig. 5) were derived from Model Outputs/Global Constraints Summary files.

5. Total costs and area treated for different categories of management treatments (Table 2) were derived from Model Outputs/Policy Results Summary files.

6. Area treated by projects for profit or loss and % retreatment each year (Fig. 6) were produced from Delta Array outputs.

7. Black Swan fire summary results, spatial reconstructions, and maps (Box 1) were produced from Delta Array outputs in a geospatial environment using the Envision IDU shapefile.

The SWCNH_Envision_Outputs_readme.txt file was generated on 2022-05-03 by Bart R. Johnson and Cody Evers

GENERAL INFORMATION

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4. Links/relationships to ancillary data sets: none

5. Was data derived from another source? no

6. Recommended citation for this dataset:
Johnson, Bart R. John P. Bolte, Alan A. Ager, David W. Hulse, Max Nielsen-Pincus and Cody R. Evers. 2011. South Willamette CNH Envision canonical simulation outputs. Eugene, OR: University of Oregon.

USING THIS REPOSITORY

1. Dataset Content
Modeling outputs were derived from 600 canonical simulation runs of the South Willamette Coupled Natural-Human Systems (SWCNH) Envision modeling system, representing 50 runs for each of 12 scenarios. The totality of model output files are provided in this dataset.

2. Dataset Organization and File Retrieval
We recommend accessing files using the Tree view option, which shows all outputs organized within five primary folders, one for each file type.

The five primary file types are Delta Arrays, Firelists, LCPs, Model Outputs, and Shapefiles. The folder for each filetype contains 12 zipped archive folders, one for each of 12 scenarios.

Each zipped scenario subfolder contains 50 output files, one each of the 50 simulation runs of that scenario. The exception is Model_Outputs, which contains 14 different output file types for each run. All files are provided in .csv format.

2.1 File Naming Schema
Each filename includes the file type name (Sect. 2.2), the three-letter scenario acronym (Sect. 2.3-2.4), and the run number (0-49). This provides a unique identifier for each simulation run and allows combining data from different file types. For example, LCM_Outputs contains tabular outputs for all 50 runs of the LCM scenario, while HCC_Firelists contains the firelists for all 50 runs of the HCC scenario (see Sect. 2.3-2.4 for scenario acronyms).

2.2 File Types

2.2.1 Delta_Arrays
Comprehensive log of changes within each landscape polygon (IDU) for a given scenario and run. Each row represents the change in a single attribute for a single IDU. Changes from policies or landscape events can affect multiple IDUs and/or attributes. Most but not all scenario output can be recreated using the delta arrays. Delta array reconstructions of the landscape's state for any attribute at any time step can be mapped using the IDU shapefile in a geospatial environment. In addition, the state of individual IDUs or groups of IDUs can be tracked through time, and precedent and antecedent states can be reconstructed for path dependency analysis.

2.2.2 Firelists
Tabular input data used to specify fire events within the Envision FlamMap API. Files are grouped by scenario containing ignitions used in each of 50 unique runs. Each row represents a single ignition and provides the ignition location, burn period, wind speed, wind direction, and fuel moisture file provided to the API. Fires were simulated using the LCP generated for the year of the burn.

2.2.3 LCPs
LCPs are multi-band raster bricks used to simulate fire behavior using the Envision FlamMap API under weather and burn conditions determined from the scenario firelists. The LCP contains 8 layers: elevation, slope, aspect, fuel model, canopy cover, canopy height, canopy base height, and canopy bulk density. The raster has 401 rows and 557 columns and is projected using NAD83 UTM Zone 10N (EPSG:26910). LCPs were only exported for year 25 and year 50.

2.2.4 Model_Outputs
Tabular outputs from Envision grouped by scenario. Each archive includes outputs from 50 runs. Each run contains 14 output files: Actor Counts; Actor Policy Application Rates; Actor Value Trajectories; Global Constraints Summary; Landscape Evaluative Statistics (Raw & Scaled); Model and AppVar Outputs; LULC (land use/land cover) Trends (3 hierarchical levels: A, B, C); Policy Effectiveness Trend; Policy Results Summary; Policy Stats; and UGA (urban growth) outputs.

2.2.5 Shapefiles
Shapefiles from Envision grouped by scenario representing state 86,067 IDUs within the study area as found at year 51 for each of the 50 runs. There are 106 fields. Geometry is projected using NAD83 UTM Zone 10N (EPSG:26910). Shapefiles are a file format used for mapped and map attribute data in industry-standard geographic information system software prevalent at the time of this Study. Mapped output from Envision use the shapefile format.

2.3 Scenario Name Coding
Output filenames include three-letter codes that identify the 12 scenarios created by fully crossing each of three scenario dimensions: Climate, Development and Management. For publications after 2016, the names and associated codes of the three management scenarios were modified from the original to better characterize scenario intentions. A scenario acronym conversion is provided below to allow users to access the appropriate output files, which retain the original acronyms.

Climate (2x):
  * MIROC A2, low impacts (L)
  * Hadley A2, high impacts (H)
Development (2x):
  * Compact development (C)
  * Dispersed development (D)
Management (3x):
  * Hazard reduction management(H) (originally C)
  * Restoration management (R) (originally M)
  * No management (N)

The code LDH thus represents the Low climate, Dispersed development, and Hazard management scenario.

2.4 Scenario Acronym Conversion for accessing output files

As noted above, scenario acronyms used in post-2016 articles vary from those used in the filenames. Only the third letter is different.

Modified (paper)	Original (filename)
HCH	HCC
HCR	HCM
HCN	HCN
HDH	HDC
HDR	HDM
HDN	HDN
LCH	LCC
LCR	LCM
LCN	LCN
LDH	LDC
LDR	LDM
LDN	LDN