Biosecurity COMMONS

Resource Allocation – Quick Start Guide

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Resource Allocation

Resource allocation is an essential component of broader biosecurity management. The management of invasive species includes effort, time, and other resources distributed across actions or responses, including:

- pre-border preventative measures
- at-border surveillance and interception
- post-border early detection surveillance and rapid responses
- eradication, containment and control efforts to suppress or minimise the spread of established invasive species
- restoration, mitigation, or adaptation responses to resultant negative impacts

Strategies for the effective prioritisation and allocation of surveillance and management resources consider trade-offs between the costs of resources and the costs or severity of incursion impacts. Effective allocations across locations, categories, species, or resource types may be found using optimisation design approaches. For more complex spatiotemporal analysis of resource allocation strategies, invasive species growth, spread, and impact dynamics may be simulated for different management scenarios. To facilitate these complementary strategies Biosecurity Commons provides two workflows:

- Resource Allocation (Design)
- Population Spread Modelling (Management Scenarios)

The **Resource Allocation (Design)** workflow enables users to optimise their management resource allocation through sophisticated analytical tools. This system can leverage geographic mapping capabilities, location-specific probability assessments, and actual occurrence data, while incorporating management effectiveness metrics and operational constraints, including budgetary limitations and required management effectiveness levels. The workflow generalises and extends the methods, parameters, and configuration options utilised in the Surveillance Design workflow.

The **Population Spread Modelling (Management Scenarios)** workflow enables users to conduct simulations to assess how potential economic, environmental, and social impacts of pest and disease incursions may accumulate over time, and how this may change under different management strategies, thus facilitating more accurate risk assessments and cost-benefit analyses. The use of management scenario simulations empowers decision-makers to develop more robust, proactive, and data-driven biosecurity policies and response plans. The workflow extends the former Dispersal Modelling workflow, which previously only simulated growth and spread, by also incorporating the simulation of incursion impacts (as per the Impact Analysis workflow) and management actions (including surveillance, control, and removal).

For more details, please see the Resource Allocation workflow support article, as well as the Population Spread Modelling quick start guide and support article.

Linkages to other workflows

Outputs from other Biosecurity Commons workflows may be used as inputs in **Resource Allocation** (**Design**) workflows, for example:

- **Risk Mapping** workflows provide outputs for spatial distributions of threat suitability, arrival and establishment likelihood, which may be utilised as occurrence likelihood inputs for **Resource Allocation** workflows.
- **Population Spread Modelling** workflows provide outputs for simulated mean spatial occupancy and population abundance at collated simulation time steps, which may be utilised as occurrence likelihood inputs for **Resource Allocation** workflows.
- **Impact Analysis** workflows provide outputs for spatial distributions of the costs or non-monetary impacts of invasive species incursions, which may be utilised as saving or benefit inputs for **Resource Allocation** workflows.

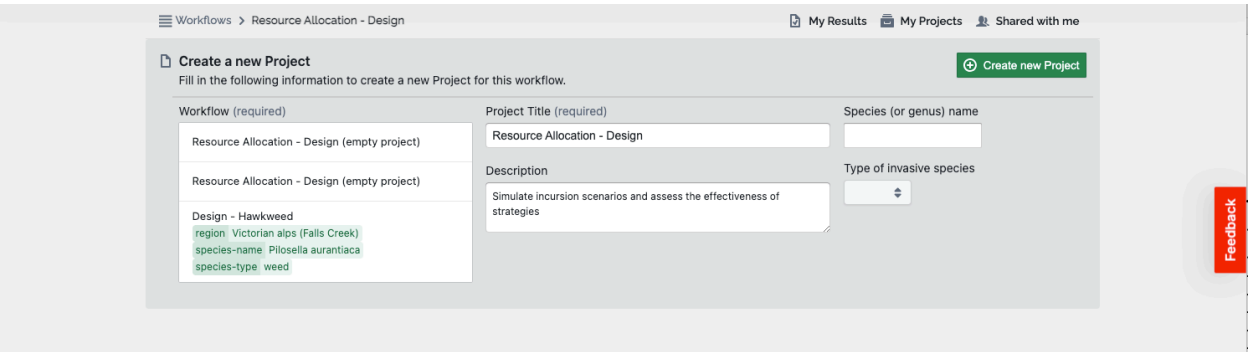
Outputs of **Resource Allocation** (**Design**) workflows can be used directly as inputs in other workflows, for example:

- **Resource Allocation** workflows provide outputs for spatial distributions of management effectiveness probabilities, which may be utilised as simulated management action inputs for **Population Spread Modelling** workflows.
- **Resource Allocation** and **Population Spread Modelling** workflows can thus be utilised iteratively as inputs and outputs for one another to refine an effective allocation of management resources.

Creating a Resource Allocation (Design)

Step 1. Create a new project

Select the Resource Allocation workflow and then select “Create a new Project”.



When creating a new resource allocation design project, users have the option to select an empty template, initially titled “Resource Allocation - Design”, which can be renamed appropriately, or a prepopulated template that has been constructed as an example of the workflow or based on a case study (e.g. “Design - Hawkweed”).

The empty template is ideal for those wishing to create a brand-new resource allocation design as it contains:

- The basic structure of the Resource Allocation Design workflow
- No preloaded datasets (except for the default region, albeit this can be easily changed)

By contrast, an example template provides users with the opportunity to see a completed demonstration of how resource allocation designs can be produced, or if based on a real-world case study, how others have attempted to create a model.

Select a template and then give your project an appropriate title. Users can optionally provide additional descriptive details under the Description, Species name and Species type fields. These metadata are presently unused but will provide future flexibility in filtering and summarising projects.

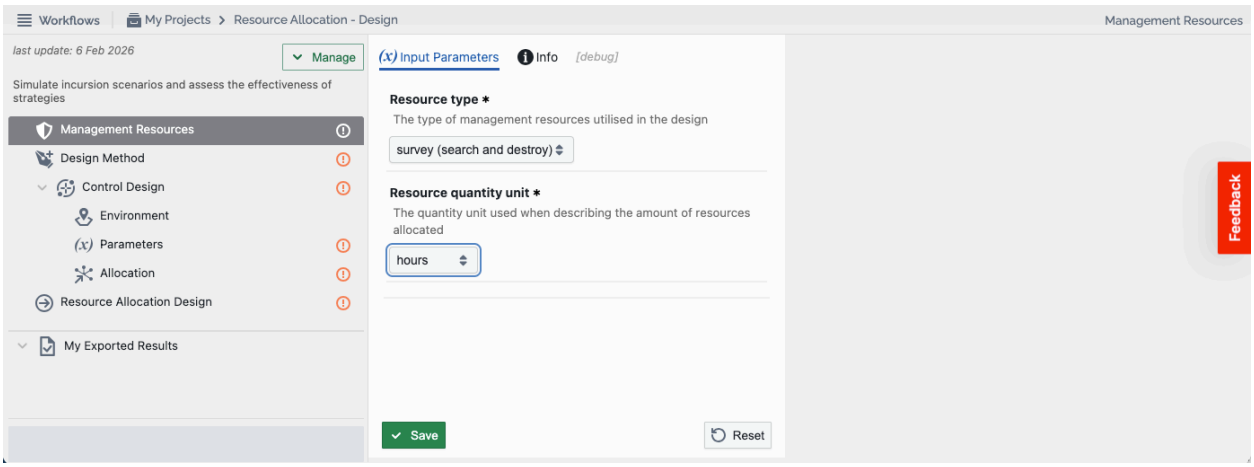
Once details have been provided, click the green “Create a new Project” button in the bottom right-hand corner to continue.

When you start a Resource Allocation Design workflow from an empty template you will be presented with the core elements of the Resource Allocation Design workflow on the left side of the screen – “Management Resources”, “Design Method” and “Resource Allocation Design”. Orange exclamation points indicate steps that require attention and, as you progress through the project, these change to green ticks when complete.

Step 2. Specify the management resources

Select appropriate details of the management resources utilised in your design, including:

- **Resource type:** The type of management resources utilised in the design (e.g. “search & destroy” surveys, traps, treatment)
- **Resource quantity unit:** The unit used when describing the quantity or amount of resource allocated (e.g. hours, units, traps, treatments)



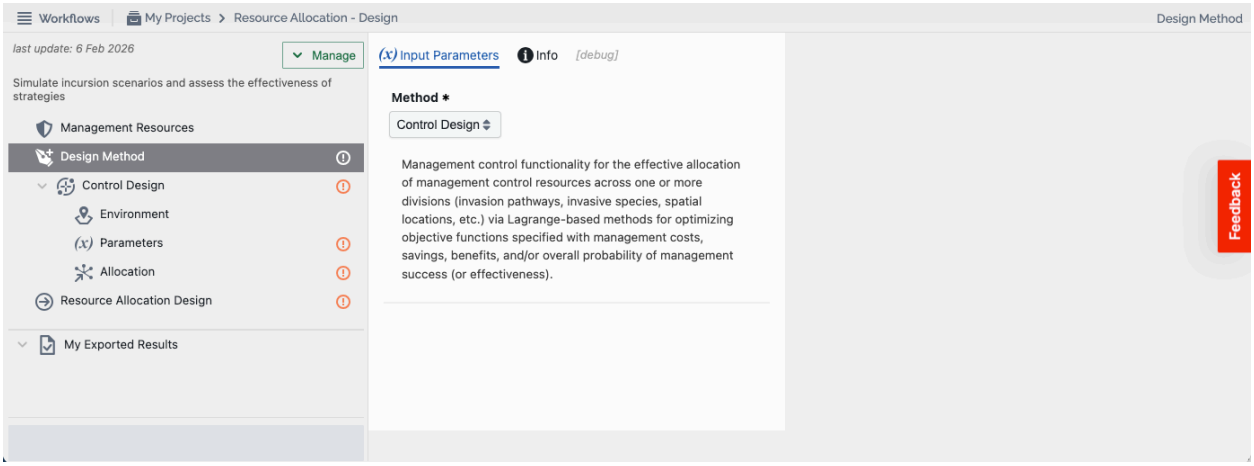
“Save” your selections when finished.

Step 3. Specify the design method

Select your resource allocation design method. Currently the following method is available:

- **Control Design**: For the effective allocation of management control resources across spatial locations or other aspatial divisions (e.g. categories, species)

Note that since only one generic resource allocation design method (Control Design) is currently available, it is preselected.



Other resource allocation design methods are anticipated in future versions of the Biosecurity Commons platform.

Depending on the method the user selects, in the future, different options will potentially become available with the method sections:

- Environment – defines the location or division partitions for the design and the occurrence probability at each partition
- Parameters – defines parameters specific to the resource allocation design method, such as the parameters associated with calculating the effectiveness (probability of success) for given allocations of discrete or continuous management resources
- Allocation – defines how effective surveillance resources are allocated, via optimisation approaches given chosen objectives (e.g. minimum total cost), constraints (e.g. total budget), and other optional parameters (e.g. fixed costs). Alternatively, existing resource allocations may be analysed (i.e. sensitivities calculated)

The “Environment” and “Allocation” sections are generally common to resource allocation design methods (including possible future methods).

Step 4. Specify the environment

Select the “Environment” section under the chosen resource allocation method to define how the management resources will be partitioned across spatial locations or other aspatial divisions, such as categories, species, or resource types. Users then specify:

- **Division type** (*Required*): Defines the type of management resource allocation divisions to be used via selection:
    - Raster grid – management resources allocated across raster grid cells (GeoTIFF)
    - Spatial locations – management resources allocated across spatial locations defined via longitude and latitude coordinates (CSV)
    - Other divisions – management resources allocated across other aspatial divisions, such as species, pathways, temporal, spatiotemporal, management type, strategies or responses (CSV)

Subsequent parameters across the workflow are configured differently dependent on the division type selected (raster grid, spatial locations, or other divisions). Next, users specify either:

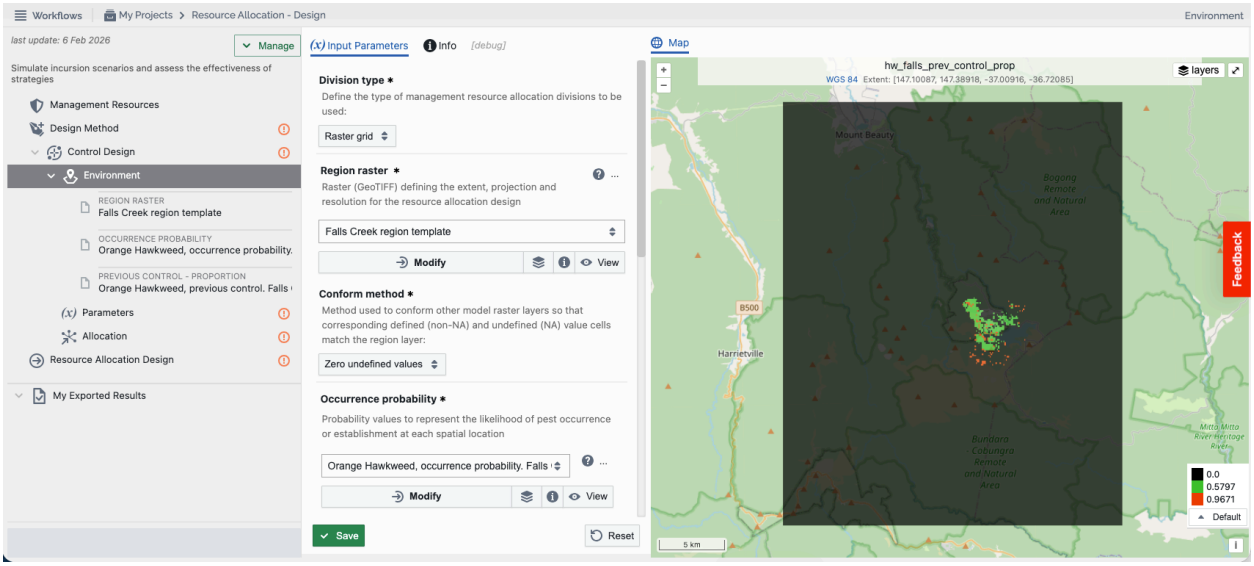
1. Raster grid division type

- **Region raster** (*Required*): Raster (GeoTIFF) defining the extent, projection and resolution for the resource allocation design
- **Conform method** (*Required*): Method used to conform other model raster layers so that corresponding defined (non-NA) and undefined (NA) value cells match the region layer, select either:
    - Zero undefined values - any cells with undefined (NA) values that do not correspond to undefined (NA) values in the region layer will be set to zero.

This default method is useful when available model layers differ in their spatial distribution of defined (non-NA) and undefined (NA) value cells.

- Nearest defined values - Any cells with undefined (NA) values that do not correspond to undefined (NA) values in the region layer will be set to the (mean) value of the nearest cell(s) with defined values. This method is useful for correcting mismatching borders or coastlines, especially those with differing resolutions.

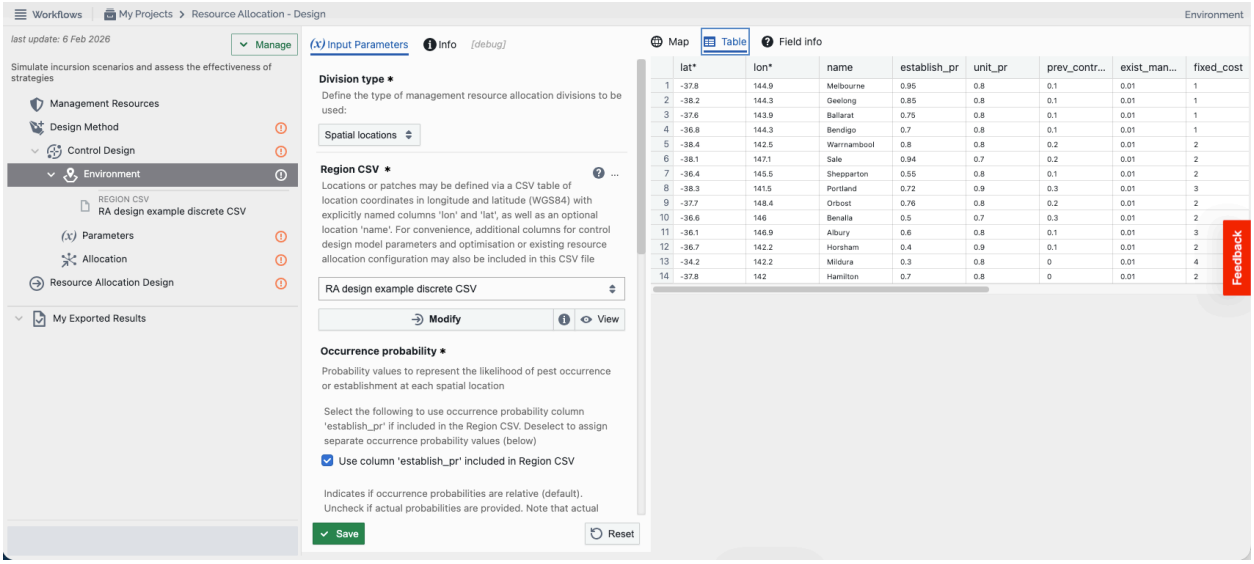
- **Occurrence probability** (*Required*): Probability values to represent the likelihood of invasive species occurrence at each region spatial location (as raster GeoTIFF). Also:
  - Specify via the “Relative probability” checkbox whether these probabilities are actual probabilities (unchecked) or relative weights (checked). Note that actual probabilities are required for cost-based or system-wide effectiveness-based optimisation of management resource allocation (see Step 6)
- **Previous control** (*Optional*): Control previously applied at each region spatial location, defined via two parameters:
  - **Previous control (proportion) values**: The proportion of the invasive species that was expected to be successfully controlled by each previous control application at each location (as raster GeoTIFF)
  - **Number of repeats**: Number of repeats of the control previously applied. Specify either:
    - As a ‘single value’ for the entire study
    - Vary values ‘across locations’ (as raster GeoTIFF)



Select “Save” if enabled (note that data file selection may autosave your selections).

2. Spatial locations division type

- **Region CSV** (*Required*): Locations or patches may be defined via a CSV table of location coordinates in longitude and latitude (WGS84) with explicitly named columns 'lon' and 'lat'. For convenience, additional columns for other model parameters may also be included in this CSV file
- **Occurrence probability** (*Required*): Probability values to represent the likelihood of invasive species occurrence at each region spatial location. Also:
    - Select the checkbox “Use column 'establish_pr' included in Region CSV” if the column has been included in the Region CSV, or define it separately by selecting another CSV file having aligned ‘lon’, ‘lat’, and 'establish_pr' columns
    - Specify via the “Relative probability” checkbox (as per OPTION 1) if the probabilities are actual (unchecked) or relative (checked). Note that actual probabilities are required for cost-based or system-wide effectiveness-based optimisation of management resource allocation (see Step 6)
- **Previous control** (*Optional*): Control previously applied at each region spatial location, defined via two parameters:
    - **Previous control (proportion) values**: The proportion of the invasive species that was expected to be successfully controlled by each previous control application at each location. Either select the checkbox “Use column ‘prev_control_prop’ when included in Region CSV”, or define it separately by selecting another CSV file having aligned ‘lon’, ‘lat’, and ‘prev_control_prop’ columns
    - **Number of repeats**: Number of repeats of the control previously applied. Specify either:
        - As a ‘single value’ for the entire study
        - Vary values ‘across locations’ by either select the checkbox “Use column ‘prev_control_rep’ when included in Region CSV”, or define it separately by selecting another CSV file having aligned ‘lon’, ‘lat’, and ‘prev_control_rep’ columns

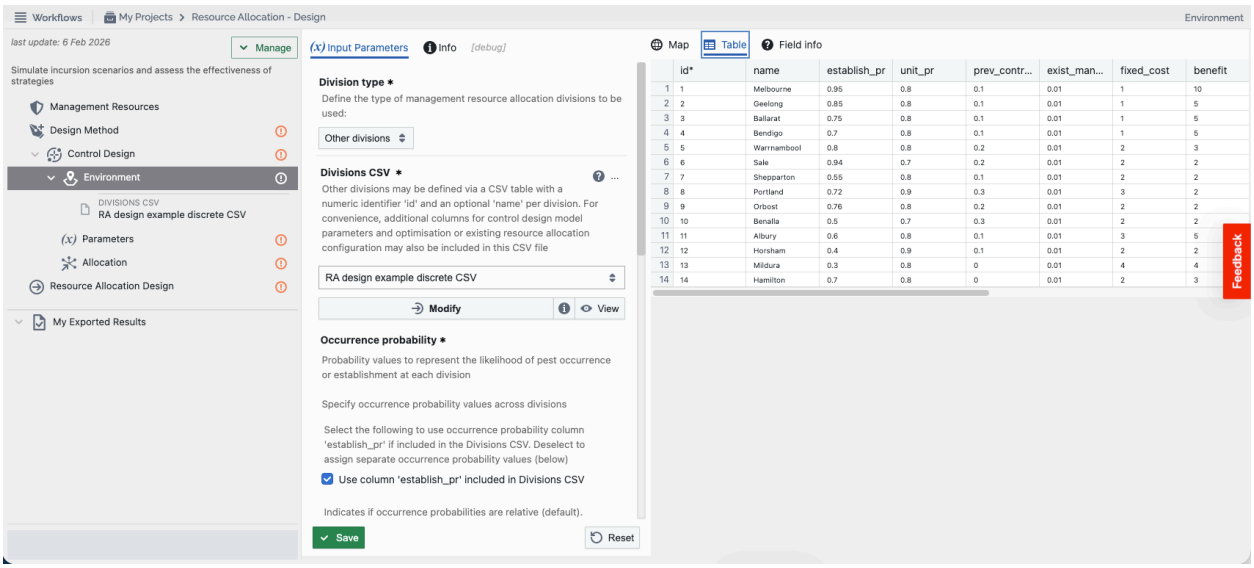


Select “Save” if enabled (note that data file selection may autosave your selections).

3. Other divisions type

- **Divisions CSV** (*Required*): Other divisions may be defined via a CSV table with a numeric identifier 'id' per division. For convenience, additional columns for other model parameters may also be included in this CSV file
- **Occurrence probability** (*Required*): Probability values to represent the likelihood of invasive species occurrence at each division. Also:
    - Select the checkbox “Use column 'establish_pr' included in Divisions CSV” if the column has been included in the Divisions CSV, or define it separately by selecting another CSV file having aligned ‘id’ and 'establish_pr' columns
    - Specify via the “Relative probability” checkbox (as per OPTION 1) if the probabilities are actual (unchecked) or relative (checked). Note that actual probabilities are required for cost-based or system-wide effectiveness-based optimisation of management resource allocation (see Step 6)
- **Previous control** (*Optional*): Control previously applied at each division, defined via two parameters:
    - **Previous control (proportion) values**: The proportion of the invasive species that was expected to be successfully controlled by each previous control application at each division. Either select the checkbox “Use column ‘prev_control_prop’ when included in Divisions CSV”, or define it separately by selecting another CSV file having aligned ‘id’, and ‘prev_control_prop’ columns

- **Number of repeats**: Number of repeats of the control previously applied. Specify either:
  - As a ‘single value’ for the entire study
  - Vary values ‘across divisions’ by either select the checkbox “Use column ‘prev_control_rep’ when included in Divisions CSV”, or define it separately by selecting another CSV file having aligned ‘id’, and ‘prev_control_rep’ columns



Select “Save” if enabled (note that data file selection may autosave your selections).

Step 5. Specify the parameters

Select the “Parameters” section under the chosen design method to define the parameters specific to the resource allocation design method. Dependent on the design method (currently only one) users specified in Step 3, either:

Control Design

- **Resource quantity type** (*Required*): Define the quantity type of the management resources, select either:
  - Continuous (e.g. control time, treatment volume)
  - Discrete (e.g. traps, removals)

The parameters that follow are dependent on the resource quantity type selected.

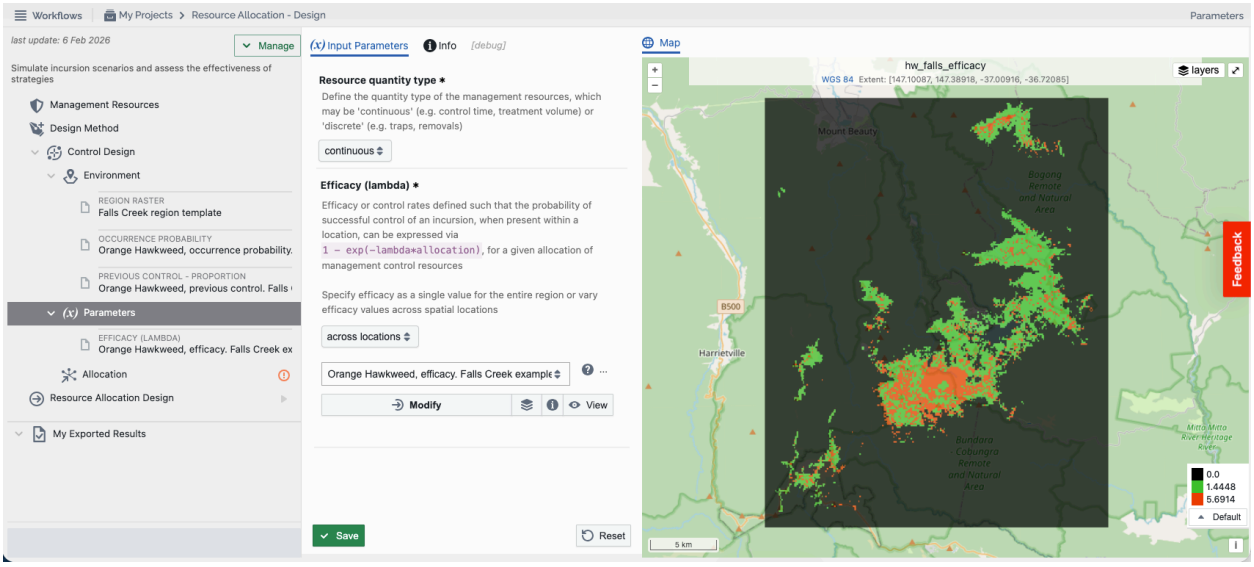
Continuous

- **Efficacy (lambda)** (*Required*): Efficacy or control rate defined such that the probability of successful control of an incursion, when present within a spatial location or aspatial division, can be expressed:

- ***1 - exp(-lambda*allocation)***

for a given allocation of management control resources. Specify either:

- As a ‘single value’ for the entire study
- Vary values ‘across locations’ (raster or point) or ‘across divisions’ (other), defined dependent on the division type selected in Step 4:
  - Raster grid (GeoTIFF)
  - Spatial locations – either select the checkbox “Use column ‘lambda’ when included in Region CSV”, or define it separately by selecting another CSV file having aligned ‘lon’, ‘lat’, and ‘lambda’ columns
  - Other divisions – either select the checkbox “Use column ‘lambda’ when included in Divisions CSV”, or define it separately by selecting another CSV file having aligned ‘id’ and ‘lambda’ columns



Select “Save” if enabled (note that data file selection may autosave your selections).

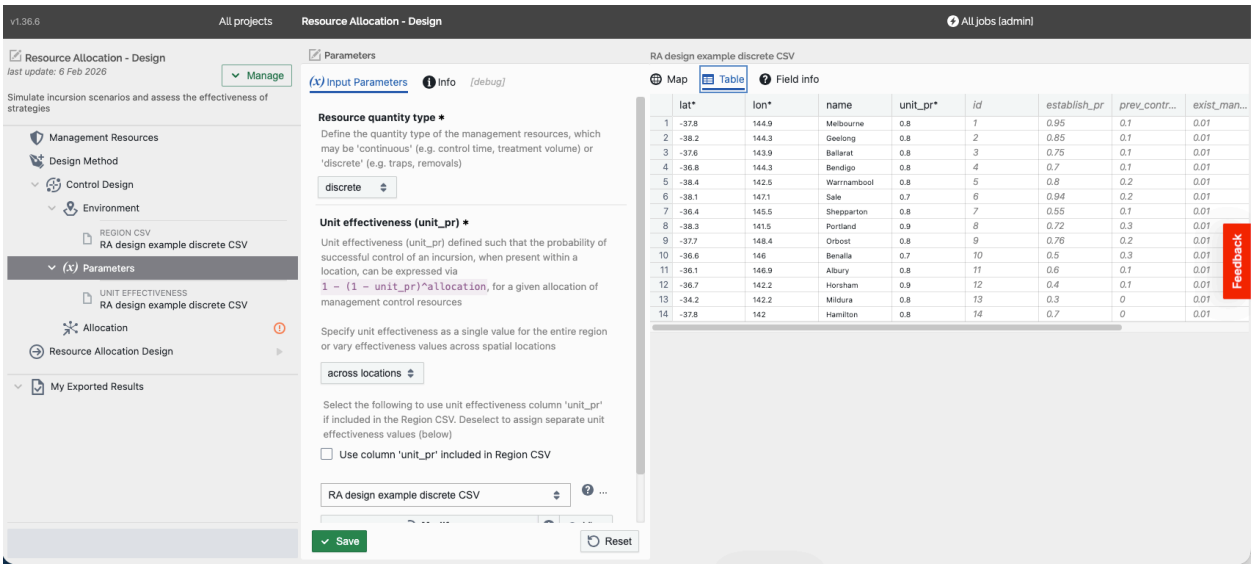
Discrete

- **Unit effectiveness (unit_pr)** (*Required*): Unit effectiveness defined such that the probability of successful control of an incursion, when present within a spatial location or aspatial division, can be expressed:
  - ***1 - (1 - unit_pr)^allocation***

for a given allocation of management control resources. Specify either:

- As a ‘single value’ for the entire study
- Vary values ‘across locations’ (raster or point) or ‘across divisions’ (other), defined dependent on the division type selected in Step 4:
  - Raster grid (GeoTIFF)

- Spatial locations – either select the checkbox “Use column ‘unit_pr’ when included in Region CSV”, or define it separately by selecting another CSV file having aligned ‘lon’, ‘lat’, and ‘unit_pr’ columns
- Other divisions – either select the checkbox “Use column ‘unit_pr’ when included in Divisions CSV”, or define it separately by selecting another CSV file having aligned ‘id’ and ‘unit_pr’ columns



Select “Save” if enabled (note that data file selection may autosave your selections).

Step 6. Specify the allocation

Select the “Allocation” section under the chosen resource allocation design method to define how effective management resources are allocated, via optimisation approaches given chosen objectives (e.g. maximum savings), constraints (e.g. total budget), and other optional parameters (e.g. fixed costs). Alternatively, existing management resource allocations may be analysed (i.e. effectiveness values calculated). Users then specify:

- **Allocation design** (*Required*): Defines the management resource allocation design to be used via selection:
    - Optimisation – find an effective allocation of management resources
    - Existing – calculate effectiveness values for an existing resource allocation design

Subsequent parameters in the allocation section are configured differently dependent on the allocation design selected (optimisation or existing).

1. Optimisation

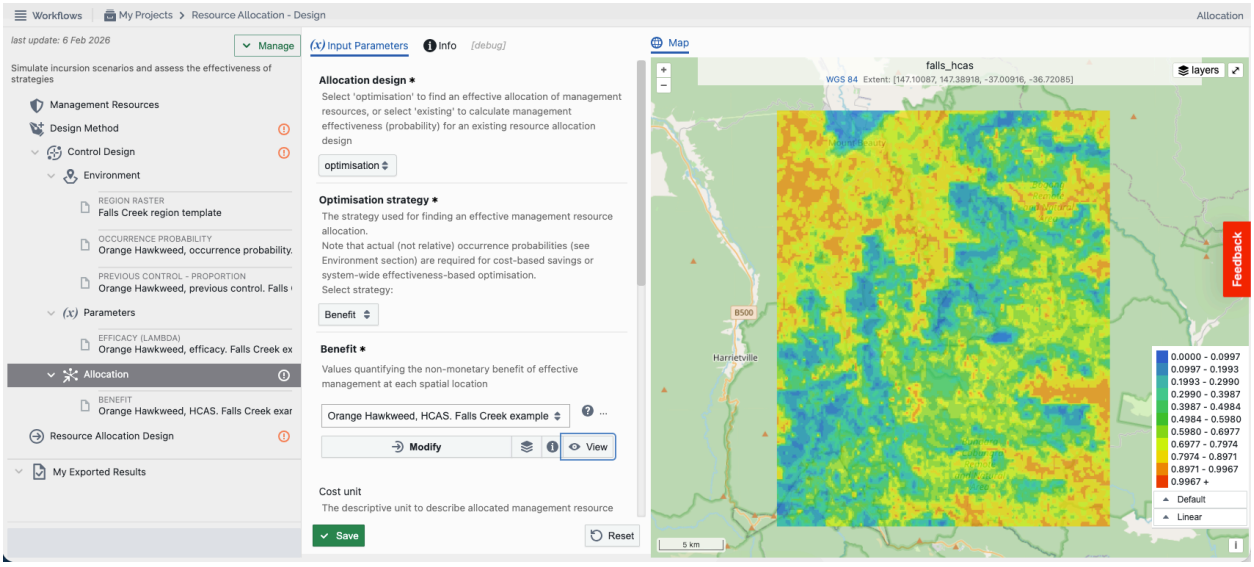
Optimisation parameters are made available after specifying:

- **Optimisation strategy** (*Required*): The strategy used for finding an effective management resource allocation via selection:
    - Saving – maximise total monetary saving (or cost-dependent benefit)
    - Benefit – maximise total non-monetary benefit
    - Successes – maximise the total number of successful management resource applications
    - Effectiveness – maximise the overall system-wide effectiveness (probability of success)

  Note that the cost-based savings option and the system-wide effectiveness option will only be available when actual occurrence probabilities are provided in Step 4, that is the "Relative probability" checkbox is unchecked.
- **Saving** (*Required for 'saving' optimisation*): Values quantifying the monetary saving (or cost-dependent benefit) of effective management at each spatial location or other division, defined dependent on the division type selected in Step 4:
    - Raster grid (GeoTIFF)
    - Spatial locations – either select the checkbox "Use column 'saving' when included in Region CSV", or define it separately by selecting another CSV file having aligned 'lon', 'lat', and 'saving' columns
    - Other divisions – either select the checkbox "Use column 'saving' when included in Divisions CSV", or define it separately by selecting another CSV file having aligned 'id' and 'saving' columns
- **Benefit** (*Required for 'cost' optimisation*): Values quantifying the non-monetary benefit of effective management at each spatial location or other division, defined dependent on the division type selected in Step 4:
    - Raster grid (GeoTIFF)
    - Spatial locations – either select the checkbox "Use column 'benefit' when included in Region CSV", or define it separately by selecting another CSV file having aligned 'lon', 'lat', and 'benefit' columns
    - Other divisions – either select the checkbox "Use column 'benefit' when included in Divisions CSV", or define it separately by selecting another CSV file having aligned 'id' and 'benefit' columns
- **Cost unit** (*Required for 'saving' optimisation*): The unit to describe effective management savings, allocated management resource costs, and/or optional fixed costs (e.g. $, hours)
- **Allocated management cost** (*Required for 'saving' optimisation, or if a cost unit is defined*): The cost per unit of allocated management resources
- **Fixed cost** (*Optional when cost unit is defined*): Fixed additional cost applied to allocated locations or other divisions (e.g. travel cost). Specify either:
    - As a 'single value' for the entire study

    - Vary values ‘across locations’ (raster or point) or ‘across divisions’ (other), defined dependent on the division type selected in Step 4:
        - Raster grid (GeoTIFF)
        - Spatial locations – either select the checkbox “Use column ‘fixed_cost’ when included in Region CSV”, or define it separately by selecting another CSV file having aligned ‘lon’, ‘lat’, and ‘fixed_cost’ columns
        - Other divisions – either select the checkbox “Use column ‘fixed_cost’ when included in Divisions CSV”, or define it separately by selecting another CSV file having aligned ‘id’ and ‘fixed_cost’ columns
- **Existing management effectiveness** (*Optional*): Existing management effectiveness (probability of success) at each spatial location or other division. Useful for representing estimated community-based management effectiveness. Defined dependent on the division type selected in Step 4:
    - Raster grid (GeoTIFF)
    - Spatial locations – either select the checkbox “Use column ‘exist_manage_pr’ when included in Region CSV”, or define it separately by selecting another CSV file having aligned ‘lon’, ‘lat’, and ‘exist_manage_pr’ columns
    - Other divisions – either select the checkbox “Use column ‘exist_manage_pr’ when included in Divisions CSV”, or define it separately by selecting another CSV file having aligned ‘id’ and ‘exist_manage_pr’ columns
- **Constraint** (*Required)*: The constraint for the resource allocation. Select:
    - None – optimal balance between allocation costs and savings (only available for optimal saving optimisation)
    - Budget - total budget constraint, either:
        - cost-based budget when cost unit is defined
        - resource-based budget when cost unit is undefined
    - Average success – a desired (minimum) weighted 'average success' probability (mean effectiveness weighted via occurrence probability)
    - Overall effectiveness – desired (minimum) overall system-wide management effectiveness (probability of success)
- **Total budget** (*Required when ‘budget’ constraint selected)*: The total cost-based or resource-based budget (as indicated or defined by the cost unit)
- **Average success probability** (*Required when ‘average success’ constraint selected)*: The desired (minimum) weighted average probability of success (or effectiveness) of the resource allocation design (e.g. 0.95). The weighted average is calculated using (relative) occurrence probability values

- **Overall effectiveness** (*Required when 'overall effectiveness' constraint selected)*: The desired (minimum) overall system-wide management 'effectiveness' (probability of success) of the resource allocation design (e.g. 0.95)
- **Discrete Allocation** (*Optional)*: Checkbox to indicate allocation should be whole numbers (e.g. traps, samples)
- **Minimum Allocation** (*Optional*): Minimum permissible allocation quantity (*avoids infeasibly small allocations to locations or divisions*)

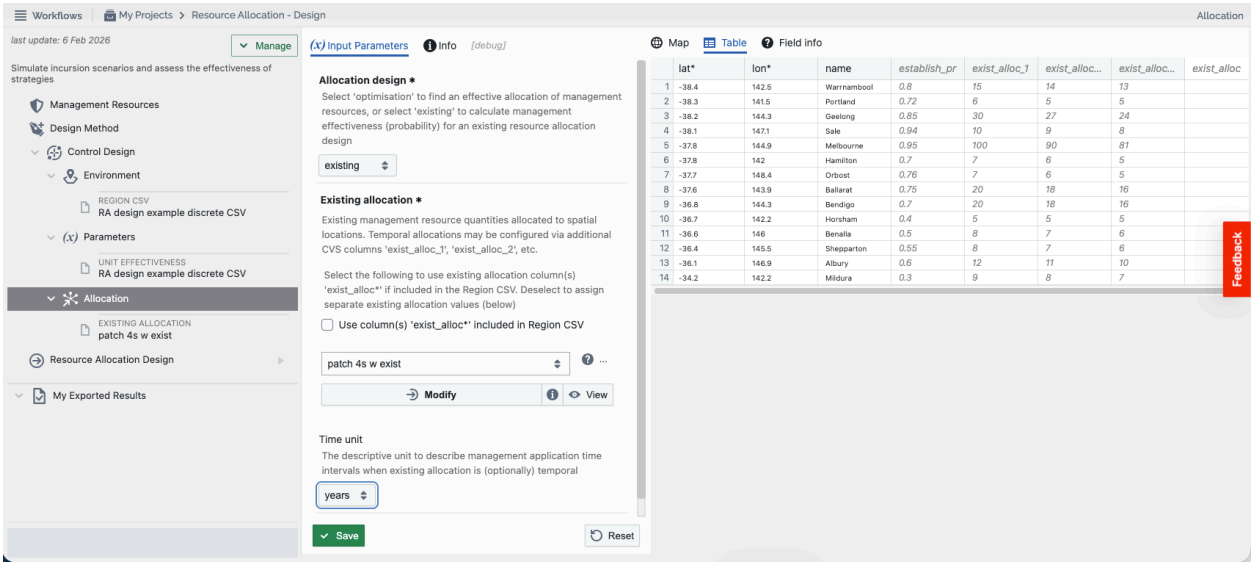


Select "Save" if enabled (note that data file selection may autosave your selections).

2. Existing

- **Existing allocation** (*Required*): Existing management resource quantities allocated to spatial locations or other divisions. Temporal allocations may be configured via multi-layered rasters or via additional columns in point-based or aspatial CSV files. Defined dependent on the division type selected in Step 4:
    - Raster grid (GeoTIFF) – multi-layer for temporal allocations
    - Spatial locations – either select the checkbox "Use column 'exist_alloc*' when included in Region CSV", or define it separately by selecting another CSV file having aligned columns for 'lon', 'lat', and 'exist_alloc' (or 'exist_alloc_1', 'exist_alloc_2', etc., when temporal)
    - Other divisions – either select the checkbox "Use column 'exist_alloc*' when included in Divisions CSV", or define it separately by selecting another CSV file having aligned columns for 'id' and 'exist_alloc' (or 'exist_alloc_1', 'exist_alloc_2', etc., when temporal)

- **Time unit** (*Optional*): The descriptive unit to describe management time intervals when existing allocation is (optionally) temporal. Select from:
    - Years
    - Months
    - Weeks
    - Days
    - Hours

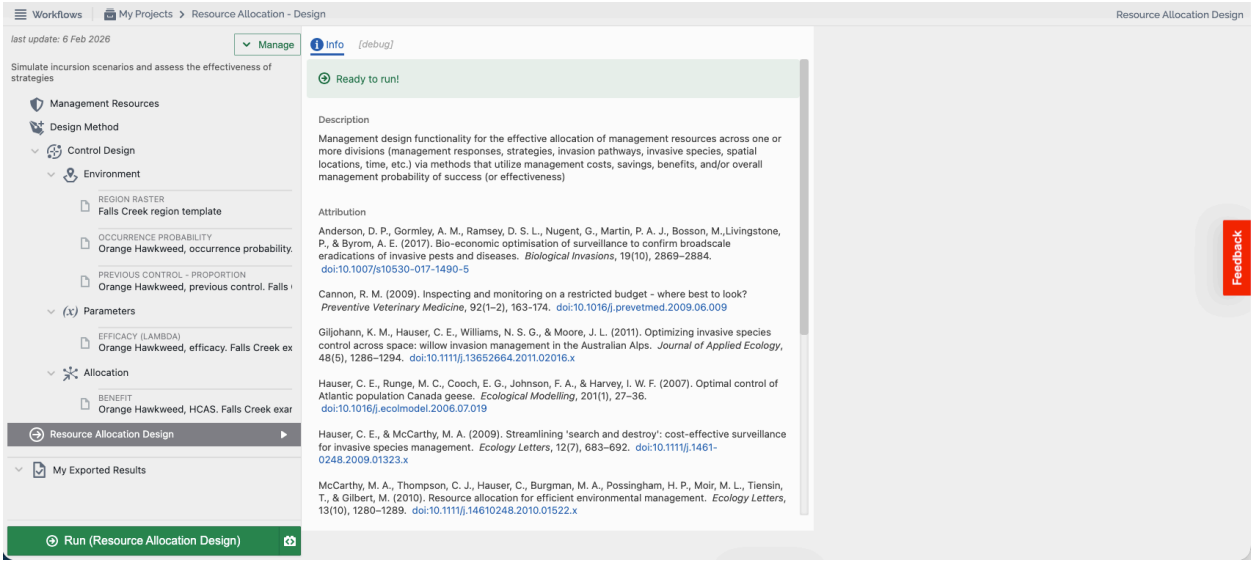


Select “Save” if enabled (note that data file selection may autosave your selections).

Step 7. Run the resource allocation design

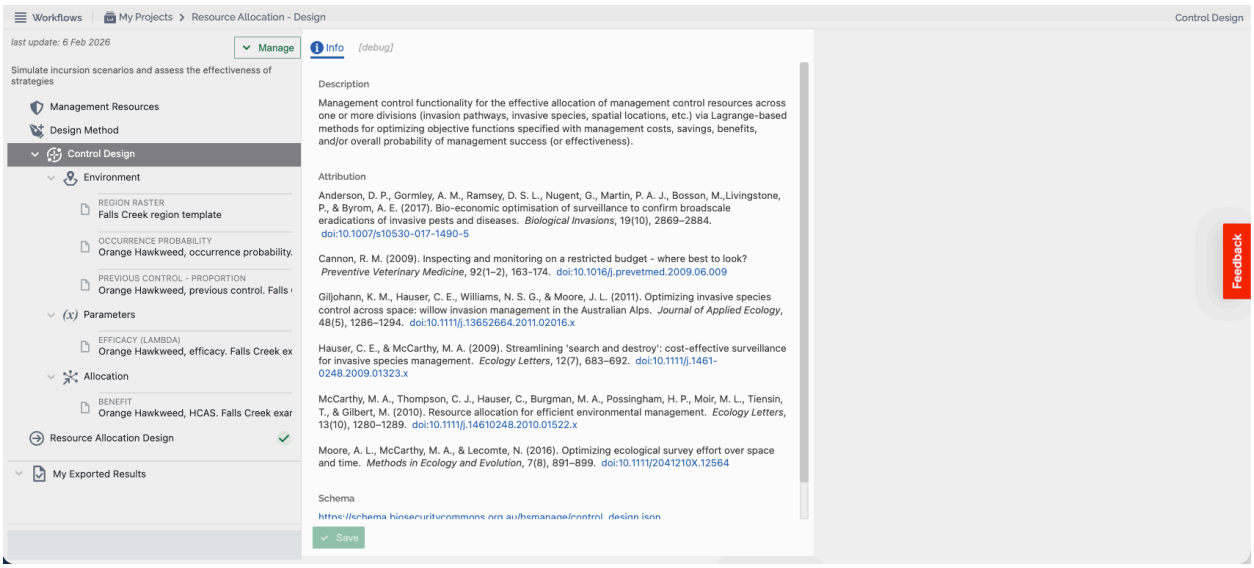
Once the Management Resources and Design Method branches and subbranches have been successfully configured you will be able to run your Resource Allocation Design, which will either:

- Find an effective allocation across spatial locations or other divisions using the optimisation strategy, constraints, and other parameters configured in Step 6, and calculate the effectiveness (probability of success) for this allocation
- Calculate the effectiveness (probability of success) across spatial locations or other divisions, as well as an overall system-wide effectiveness, for an existing management resource allocation configured in Step 6. This may also be performed for temporal values when provided



Click the ‘Run’ button in the bottom left to run your project. The output page will be updated as the job progresses from “Created”, “Submitted”, “Started” and “Success”.

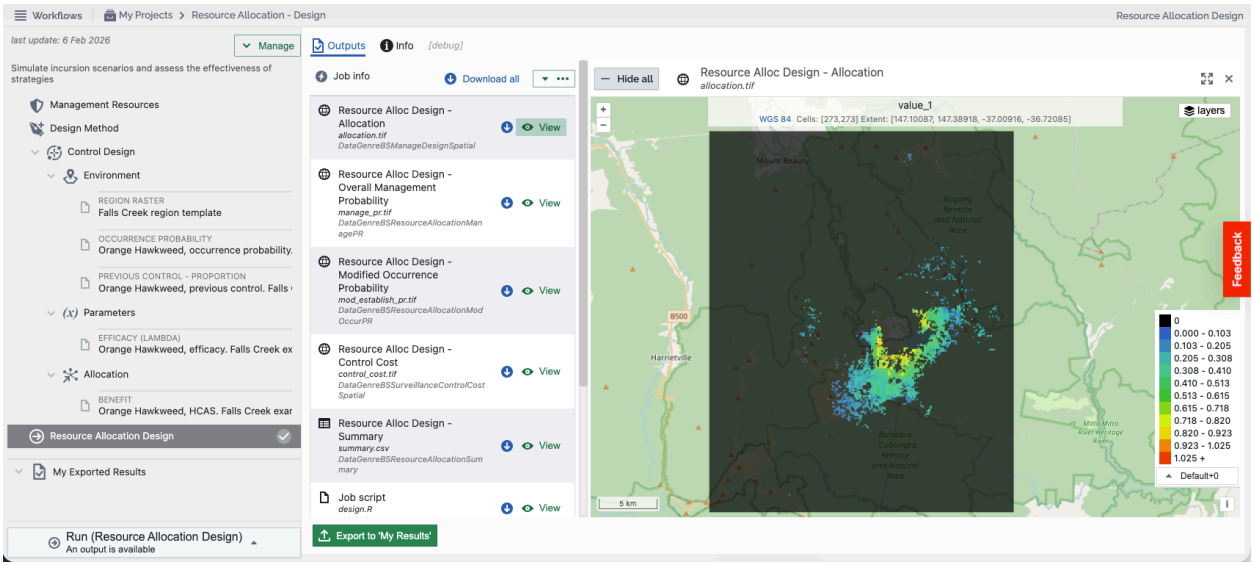
Once it has finished, a green tick will appear next to Resource Allocation Design.



The model management resource allocation output may be displayed as a viewable allocation in the output pane. The outputs provided depend on the design method and the environment region type selected by the user.

Optimal raster output

For optimal raster-based spatial resource allocation designs the outputs will be presented, including maps of the spatial allocations, effectiveness, costs (when applicable), and other files.



Users can zoom in or out of regions of interest. Interactive maps also allow users to change the type of legend displayed.

Clicking on the buttons allows users to view and download the outputs.

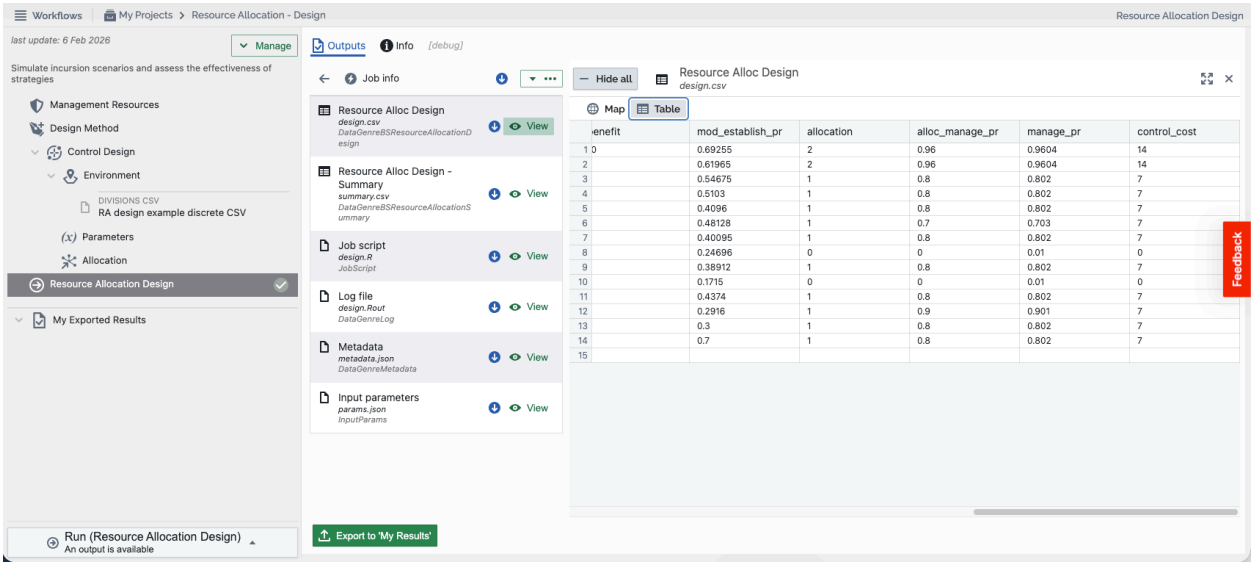
These optimal raster-based resource allocation design outputs include:

- **Resource Alloc Design – Allocation** – A GeoTIFF containing quantity of allocated management resources across geographic space
- **Resource Alloc Design – Overall Management Probability** – A GeoTIFF of probabilities of success (effectiveness) given management allocation and any optionally specified existing effectiveness. This file may be used to configure control action effectiveness within a Population Spread Model workflow
- **Resource Alloc Design – Allocation Management Probability** – A GeoTIFF of probabilities of success (effectiveness) of the management allocation only, which is only present when optionally existing effectiveness are also specified.
- **Resource Alloc Design – Modified Occurrence Probability** – A GeoTIFF of modified occurrence (establishment) probabilities when optional previous management controls were specified
- **Resource Alloc Design – Control Cost** – A GeoTIFF of surveillance costs given management resource allocation (when costs are provided in the allocation parameters). This file may be used to configure control action costs within a Population Spread Model workflow

- **Resource Alloc Design – Summary** – A CSV file containing summary information across the entire study regions, such as total allocation, total allocation, fixed, & overall costs (when applicable), plus system-wide average and overall probability of management success (effectiveness)
- **Job script** – A copy of the R script used to build the risk map
- **Log file** – A text file containing processes, messages, and other details associated with model runs
- **Metadata** – A .json file containing the metadata required to run the model on Biosecurity Commons
- **Input parameters** – Input parameters required to run the Job Script

Optimal CSV output

For point-based or other division-based optimal resource allocation designs the output will present a table with the generated management resource allocations and their corresponding effectiveness (probability of success), as well as associate (control) costs when configured in the allocation parameters, for each spatial location or other division appended to columns provided when defining the environment region or divisions, as well as modified occurrence (establishment) probabilities when optional previous management controls were specified.



Clicking on the buttons allows users to view and download the outputs.

These optimal CSV-based resource allocation design outputs include:

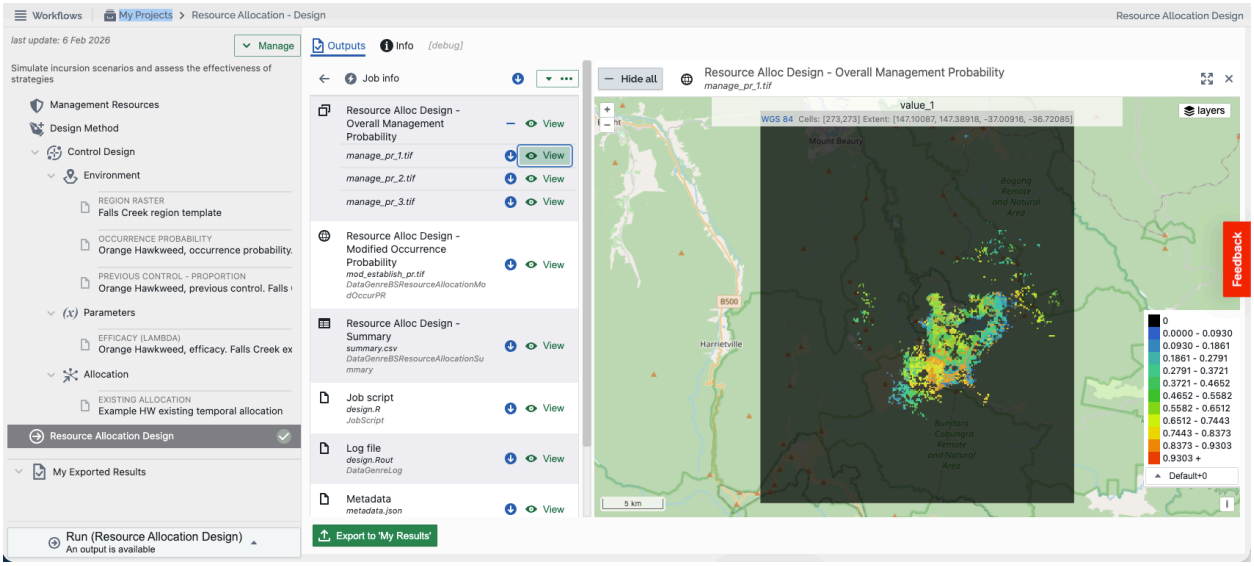
- **Resource Alloc Design** – A CSV containing generated management resource allocations and the probability of (overall) management success (effectiveness), the effectiveness associated with the allocation only when existing effectiveness is provided, as well as associate (control) costs when configured in the allocation

parameters, for each spatial location or other division appended to columns provided when defining the environment region or divisions, as well as modified occurrence (establishment) probabilities when optional previous management controls were specified

- **Resource Alloc Design – Summary** – A CSV file containing summary information across the entire study regions, such as total allocation, total allocation, fixed, & overall costs (when applicable), plus system-wide average and overall probability of management success (effectiveness)
- **Job script** – A copy of the R script used to build the risk map
- **Log file** – A text file containing processes, messages, and other details associated with model runs
- **Metadata** – A .json file containing the metadata required to run the model on Biosecurity Commons
- **Input parameters** – Input parameters required to run the Job Script

Existing raster output

For existing raster-based spatial resource allocation designs the output will present a map of the generated probability of management success (effectiveness) corresponding to each (optionally temporal) existing allocation.



Clicking on the buttons allows users to view and download the outputs.

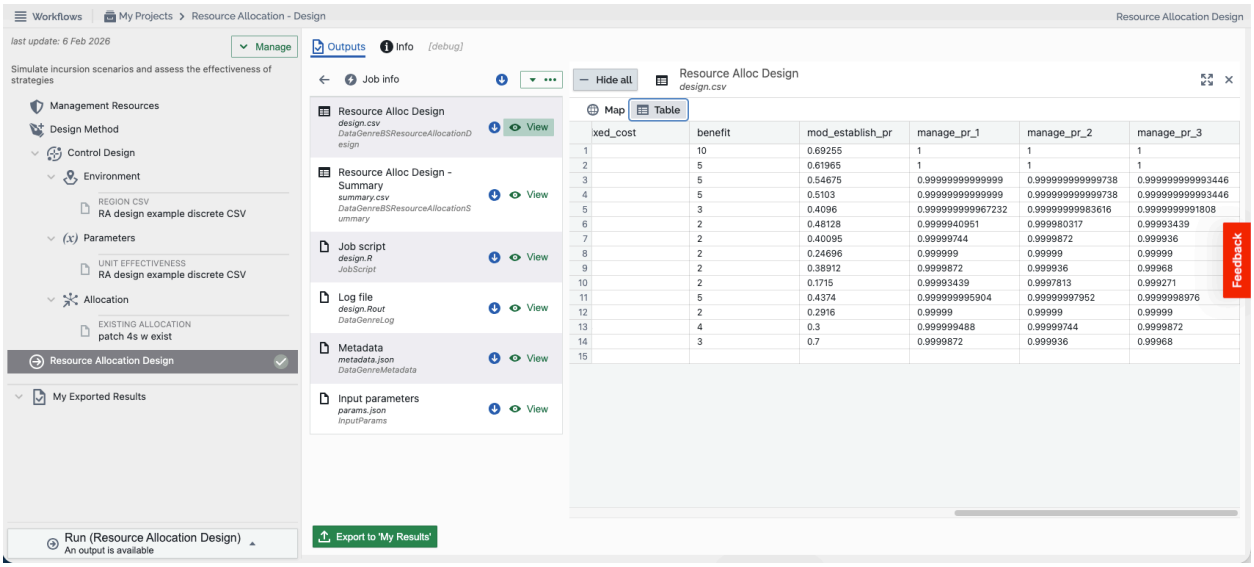
These existing grid-based surveillance design outputs include:

- **Resource Alloc Design – Management Probability** – A GeoTIFF of probabilities of success (effectiveness) corresponding to each (optionally temporal) existing allocation

- **Resource Alloc Design – Modified Occurrence Probability** – A GeoTIFF of modified occurrence (establishment) probabilities when optional previous management controls were specified
- **Resource Alloc Design – Summary** – A CSV file summarising the system-wide average and overall probability of management success (effectiveness) corresponding to each (optionally temporal) existing allocation
- **Job script** – A copy of the R script used to build the risk map
- **Log file** – A text file containing processes, messages, and other details associated with model runs
- **Metadata** – A .json file containing the metadata required to run the model on Biosecurity Commons
- **Input parameters** (*All models*)**:** Input parameters required to run the Job Script

Existing CSV output

For existing point-based or other division-based resource allocation designs the output will present a table with the generated probability of management success (effectiveness) corresponding to each (optionally temporal) existing allocation for each spatial location or other division appended to columns provided when defining the environment region or divisions, as well as modified occurrence (establishment) probabilities when optional previous management controls were specified.



Clicking on the buttons allows users to view and download the outputs.

These existing CSV-based surveillance design outputs include:

- **Resource Alloc Design** – A CSV containing generated probability of management success (effectiveness) corresponding to each (optionally temporal) existing allocation for each spatial location or other division appended

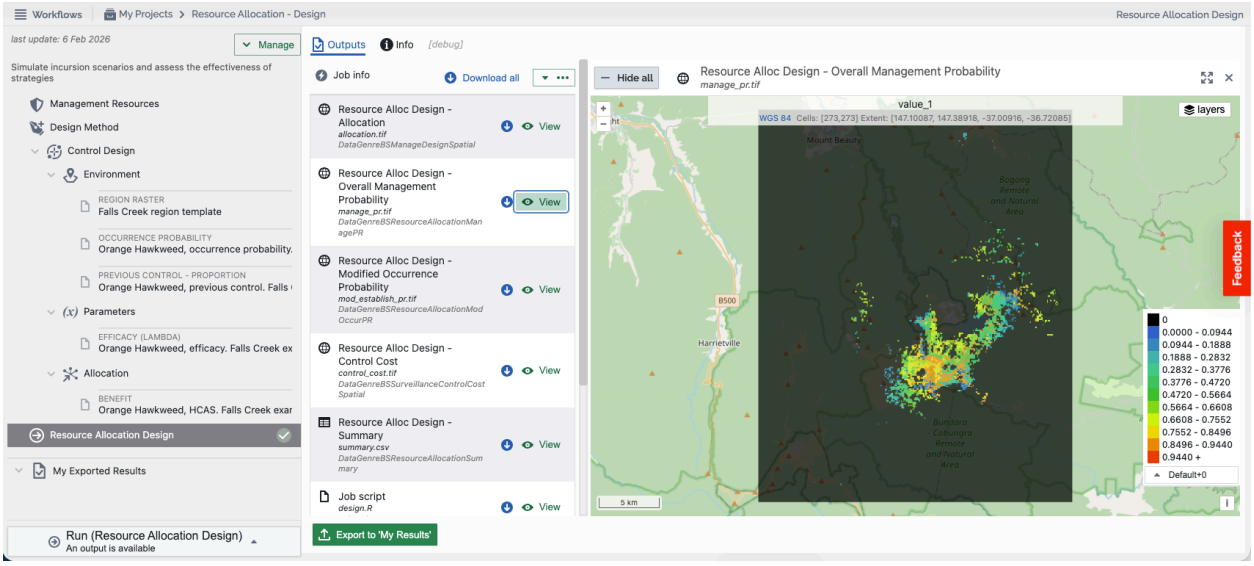
to columns provided when defining the environment region or divisions, as well as modified occurrence (establishment) probabilities when optional previous management controls were specified

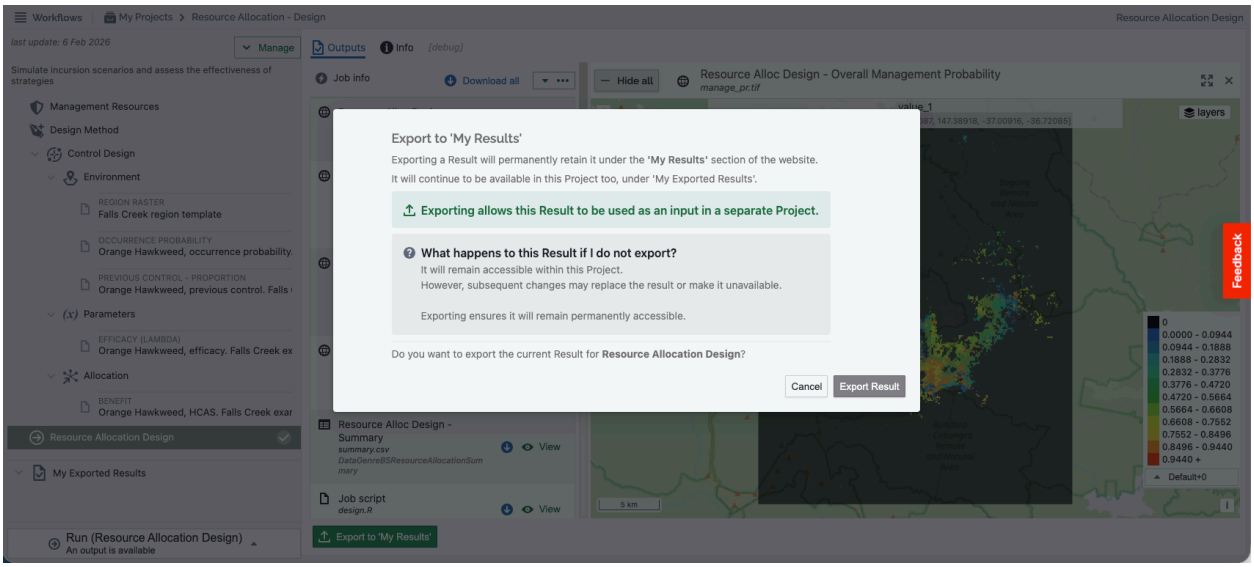
- **Resource Alloc Design – Summary** – A CSV file summarising the system-wide average and overall probability of management success (effectiveness) corresponding to each (optionally temporal) existing allocation
- **Job script** – A copy of the R script used to build the risk map
- **Log file** – A text file containing processes, messages, and other details associated with model runs
- **Metadata** – A .json file containing the metadata required to run the model on Biosecurity Commons
- **Input parameters** – Input parameters required to run the Job Script

Step 8. Exporting outputs for use in other workflows

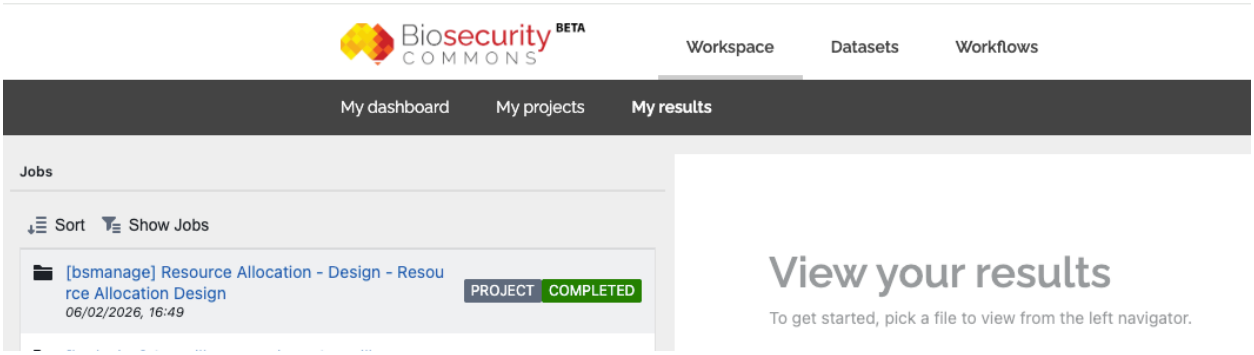
Users may wish to export outputs for use in other projects or other workflows. For example, the generated probability of management success (effectiveness), as well as the modified occurrence (establishment) probabilities (when optional previous management controls were specified), may be used as inputs for the Population Spread Modelling workflow management/control actions.

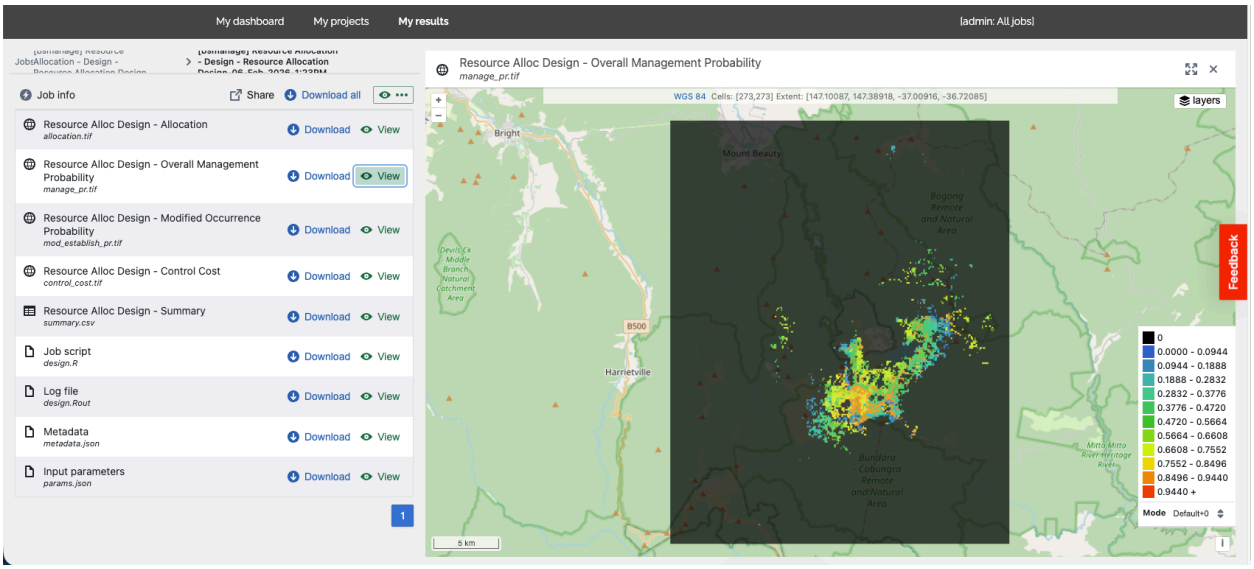
To do this, select “Export to My Results” in the bottom left corner of the output display. Note that all results are exported.



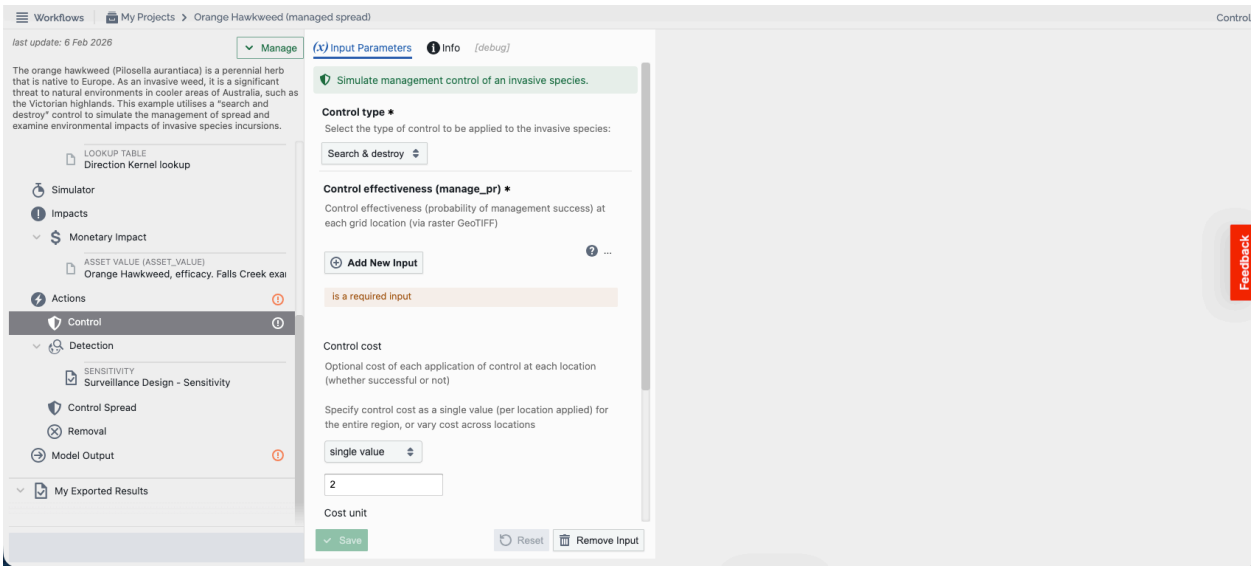


This output will now be discoverable in the user's "My results" database, which in turn makes the layer available for use in other workflows.

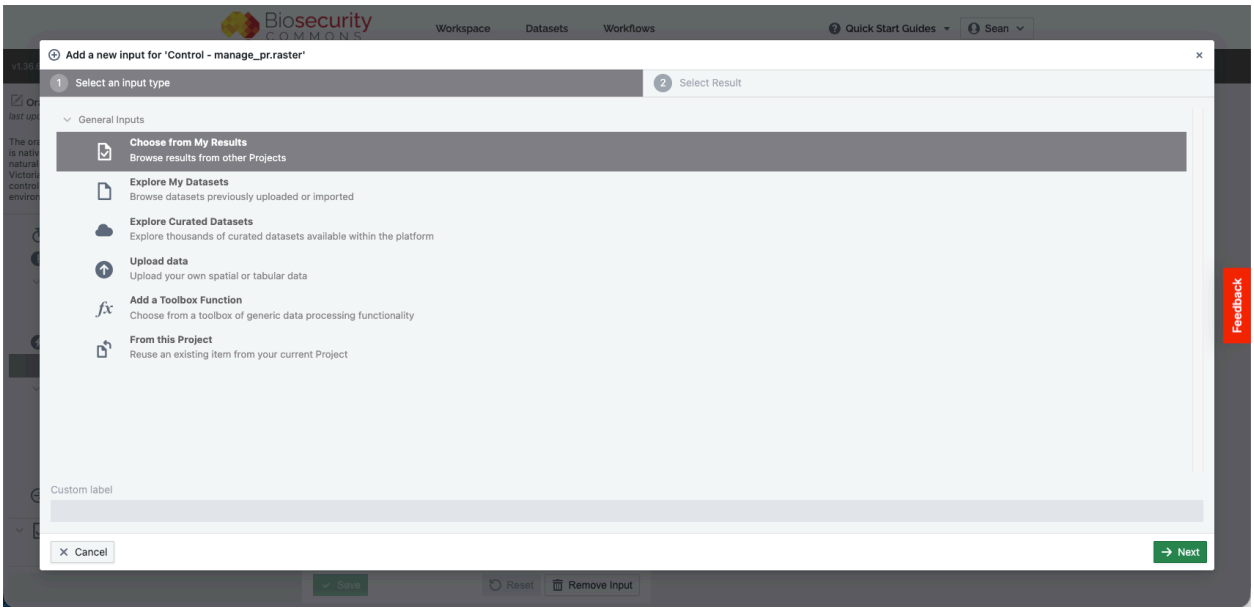


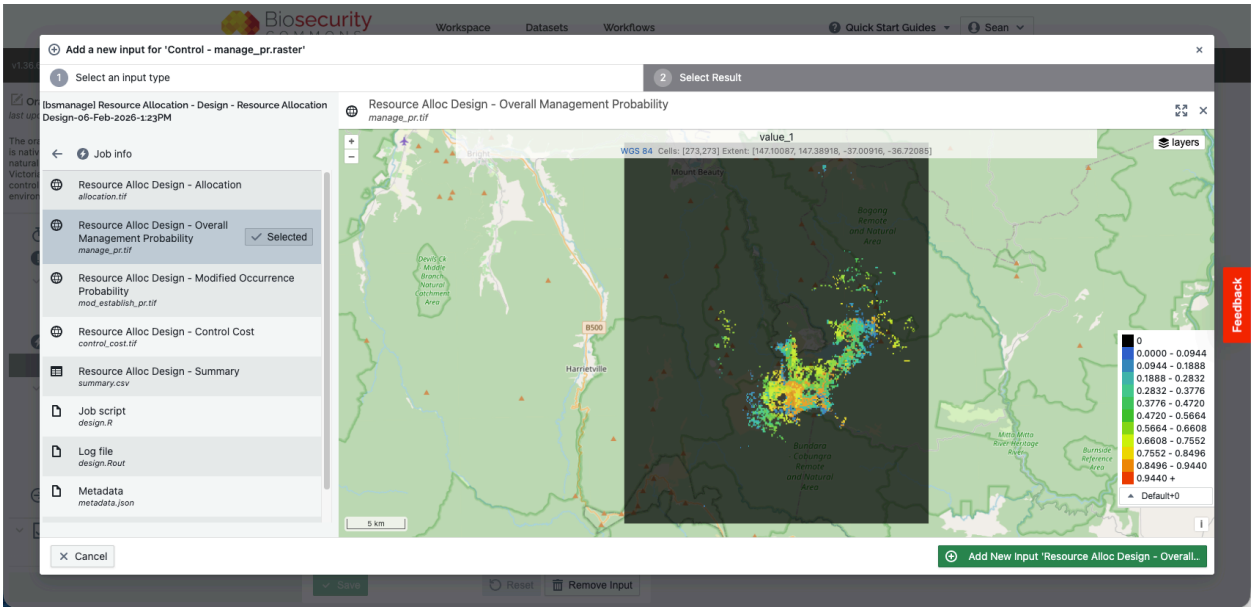


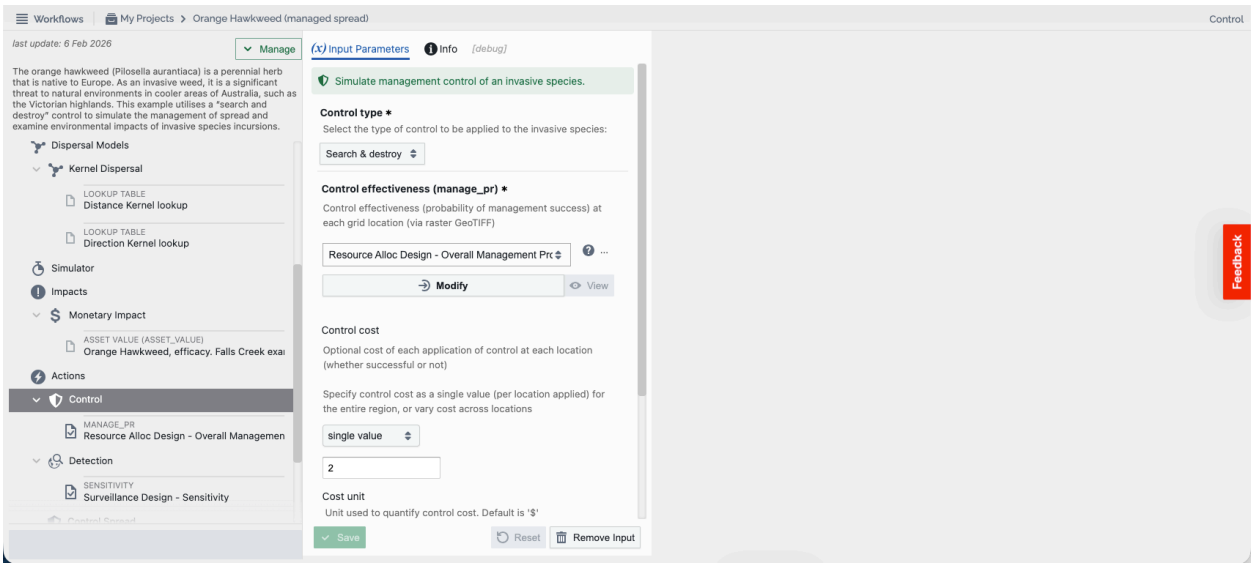
For example, within the Population Spread Modelling workflow, the probability of management success (effectiveness) result may be utilised as an input for the Control effectiveness within a simulated control action.

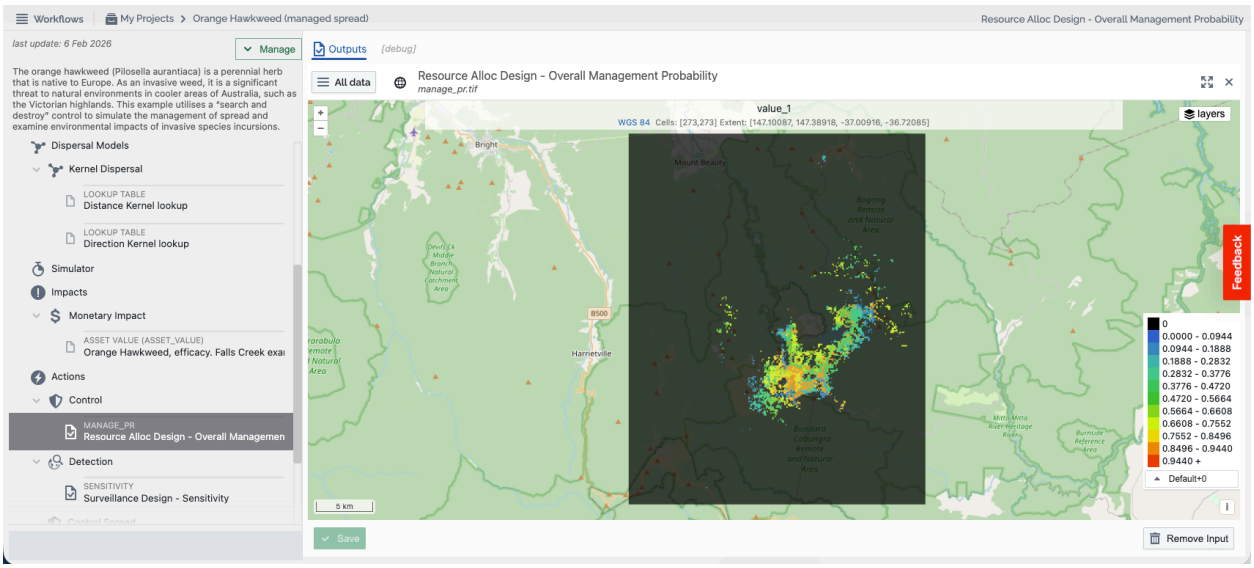


By selecting “Add New Input” then “Choose from My Results”, the desired result may be located and selected.

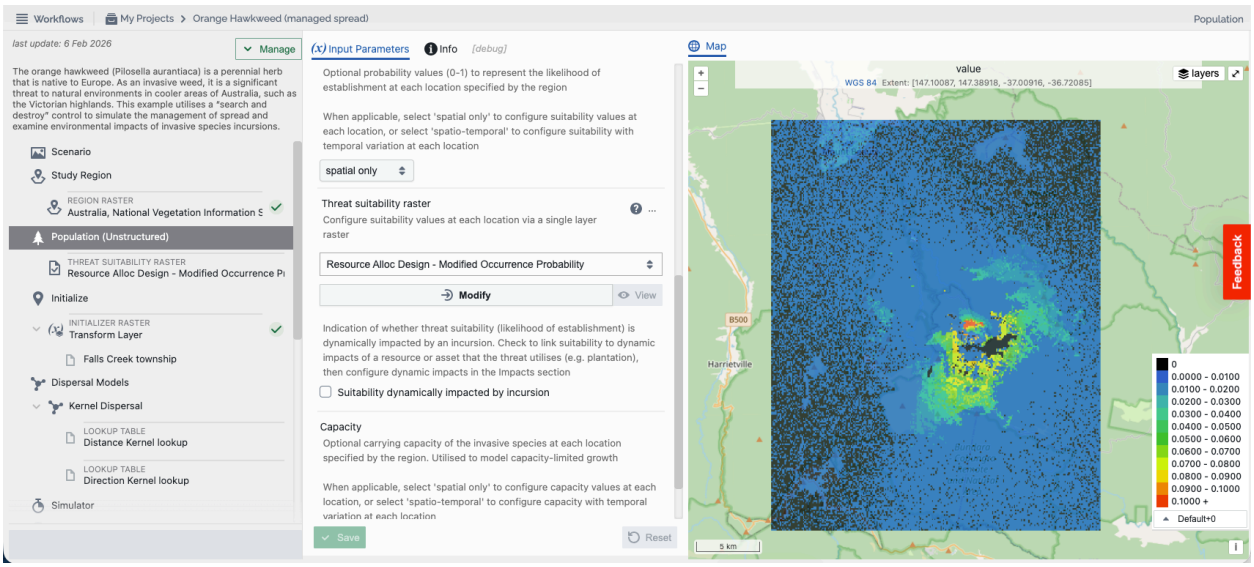

Biosecurity COMMONS
Workspace
Datasets
Workflows
Quick Start Guides
Sean
Add a new input for 'Control - manage_pr.raster'
1 Select an input type
2 Select Result
General Inputs
Choose from My Results
Browse results from other Projects
Explore My Datasets
Browse datasets previously uploaded or imported
Explore Curated Datasets
Explore thousands of curated datasets available within the platform
Upload data
Upload your own spatial or tabular data
Add a Toolbox Function
Choose from a toolbox of generic data processing functionality
From this Project
Reuse an existing item from your current Project
Custom label
Cancel
Next
Feedback


Biosecurity COMMONS
Workspace
Datasets
Workflows
Quick Start Guides
Sean
Add a new input for 'Control - manage_pr.raster'
1 Select an input type
2 Select Result
[bsmanage] Resource Allocation - Design - Resource Allocation Design-06-Feb-2026-1:23PM
Job info
Resource Alloc Design - Allocation
allocation.tif
Resource Alloc Design - Overall Management Probability
manage_pr.tif
Selected
Resource Alloc Design - Modified Occurrence Probability
mod_establish_pr.tif
Resource Alloc Design - Control Cost
control_cost.tif
Resource Alloc Design - Summary
summary.csv
Job script
design.R
Log file
design.Rout
Metadata
metadata.json
Resource Alloc Design - Overall Management Probability
manage_pr.tif
value_1
WGS 84 Cells: [273,273] Extent: [147.10087, 147.38918, -37.00916, -36.72085]
layers
Mount Beauty
Harrietville
B500
5 km
0
0.0000 - 0.0944
0.0944 - 0.1888
0.1888 - 0.2832
0.2832 - 0.3776
0.3776 - 0.4720
0.4720 - 0.5664
0.5664 - 0.6608
0.6608 - 0.7552
0.7552 - 0.8496
0.8496 - 0.9440
0.9440 +
Default+0
Cancel
Add New Input 'Resource Alloc Design - Overall..
Feedback





Similarly, the modified occurrence (establishment) probabilities result may be utilised as an input for the population threat suitability layer. See the Population Spread Modelling workflow and other support material.


Workflows
My Projects
Orange Hawkweed (managed spread)
Population
last update: 6 Feb 2026
Manage
The orange hawkweed (Pilosella aurantiaca) is a perennial herb that is native to Europe. As an invasive weed, it is a significant threat to natural environments in cooler areas of Australia, such as the Victorian highlands. This example utilises a "search and destroy" control to simulate the management of spread and examine environmental impacts of invasive species incursions.
Scenario
Study Region
REGION RASTER
Australia, National Vegetation Information S
Population (Unstructured)
THREAT SUITABILITY RASTER
Resource Alloc Design - Modified Occurrence Pr
Initialize
INITIALIZER RASTER
Transform Layer
Falls Creek township
Dispersal Models
Kernel Dispersal
LOOKUP TABLE
Distance Kernel lookup
LOOKUP TABLE
Direction Kernel lookup
Simulator
(x) Input Parameters
Info
[debug]
Optional probability values (0-1) to represent the likelihood of establishment at each location specified by the region
When applicable, select 'spatial only' to configure suitability values at each location, or select 'spatio-temporal' to configure suitability with temporal variation at each location
spatial only
Threat suitability raster
Configure suitability values at each location via a single layer raster
Resource Alloc Design - Modified Occurrence Probability
Modify
View
Indication of whether threat suitability (likelihood of establishment) is dynamically impacted by an incursion. Check to link suitability to dynamic impacts of a resource or asset that the threat utilises (e.g. plantation), then configure dynamic impacts in the Impacts section
Suitability dynamically impacted by incursion
Capacity
Optional carrying capacity of the invasive species at each location specified by the region. Utilised to model capacity-limited growth
When applicable, select 'spatial only' to configure capacity values at each location, or select 'spatio-temporal' to configure capacity with temporal variation at each location
Save
Reset
Map
value
WGS 84 Extent: [147.10087, 147.38918, -37.00916, -36.72085]
layers
Feedback
B500
Harrietville
0
0.0000 - 0.0100
0.0100 - 0.0200
0.0200 - 0.0300
0.0300 - 0.0400
0.0400 - 0.0500
0.0500 - 0.0600
0.0600 - 0.0700
0.0700 - 0.0800
0.0800 - 0.0900
0.0900 - 0.1000
0.1000 +
Default+0
5 km