Manaaki Whenua
Landcare Research

Weed biocontrol database upgrade – a Regional Council Manaaki Whenua – Landcare Research shared data collection and storage tool

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Weed biocontrol database upgrade – a Regional Council Manaaki Whenua – Landcare Research shared data collection and storage tool

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Summary

Project and Client

- This report investigates data collection and storage solutions to enable sharing of weed biocontrol agent release and recovery information between MWLR and RCs, and identifies the steps required to achieve this. The work was done for Horizons Regional Council.

Objectives

- Determine the requirements for a system than can be used by RCs to collect and send biocontrol of weeds data to a centralised database that will be accessible to all RCs, as well as MWLR, for analysis and reporting.

Methods

- Engage with RCs to determine what tools are currently used to collect and store weed biocontrol agent release and recovery data, what can be learnt/adopted, and where improvements can be made.
- Determine if there are common tools that can be extended to, and used by, all RCs and MLWR, and how much this might cost.
- Determine data collection and storage options based on the needs of RCs and MWLR.

Results

- BOPRC has already developed a system to collect, store and analyse/share weed biocontrol agent release and recovery data that could be extended to other RCs. This includes using ESRI hosted Survey 1,2,3 (collector app) with data automatically stored in the cloud as a feature collection which can be analysed and shared with AGOL.

Conclusions & Recommendations

- Implement the BOPRC model throughout RCs and develop an API to allow for specific data transfer from cloud-based feature collections into a relational database for MWLR use.
- Apply for an Envirolink tools grant to implement this system and deal with data ownership, sharing and privacy issues.

1 Introduction

Currently, the majority of weed biocontrol agent release and recovery data are collected on paper forms in the field by Regional Council (RC) staff and emailed to Manaaki Whenua – Landcare Research (MWLR) to be manually transferred into an Access database. These data collection and transfer methods are inefficient, and the database is not user-friendly or widely accessible outside of MWLR. If RCs want to retrieve information from the database, they need to send a request to MWLR, which is then processed, and the data returned. The system is old and clunky with limited utility and needs upgrading. In addition to this, RCs hold their own biocontrol of weeds data in various forms for recording regional re-release and recovery data to which MWLR have no access. An improved data collection and storage system would enable more efficient site checks, before and after photography to be captured, distribution maps to be produced, analysis of trends more easily determined, and better reporting of biocontrol of weeds outcomes. The environment will benefit as better tracking of biocontrol releases, and subsequent agent spread, will lead to better control of weeds.

2 Objectives

Find out what data collection and database solution would enable secure data sharing between MWLR and RCs and identify the steps required to achieve this.

Gain information that will inform the requirements for the design of a collection system than can be used by RCs to collect data and send to a centralised database that will be accessible to all RCs, as well as MWLR, for analysis and reporting requirements.

3 Methods

- Engage with RCs to determine what tools are currently used to record and store biocontrol agent release and recovery data, what can be learnt/adopted, and where improvements can be made.
- Determine if there are common tools that can be extended to, and used, by all RCs and MLWR, and how much this might cost for the respective parties.
- Determine data collection and storage options based on the needs of RCs and MWLR.

4 Results

Data collection and storage issues and options were discussed with representatives from RCs at the National Biocontrol Collective (NBC) meeting held in Wellington on 13 October 2020. Members agreed that there is an appetite to upgrade and streamline the current outdated system and that solutions were worth investigating.

A presentation was given on 27 October 2021 to RCs at the 2021 NBC videoconference meeting on how data collection and storge tools might work and link together for the benefit of both RCs and MWLR. Written feedback was encouraged. A follow up request for feedback was sent on 4 February 2022 and 12 RCs provided information that is collated in the attached spreadsheet (Appendix 1).

Feedback showed that the Survey 1,2,3 app (hosted by Environmental Systems Research Institute – ESRI) is already being used by 4 of 13 RCs and is the preferred electronic option for data collection. RC data storage appears to be a mix of in-house (ranging from excel spreadsheets to internal databases) and cloud-based systems, with ESRI cloud-based storage being most common. Analysis of weed biocontrol data does not appear to be undertaken by all RCs and MWLR currently supplies reports on demand to fill this shortfall as required. ArcGIS is the software most commonly available for use by RCs to enable basic in-house data analysis capability. Eight RCs are already using, or are moving toward, this platform. Bay of Plenty Regional Council (BOPRC) have already started to use a system called GeoPest that incorporates all the most used elements above for collection, storage, and analysis of their biocontrol of weeds data.

5 Discussion

Use of a data collection application like Survey 1,2,3 that automatically pushes data to a cloud-based database/feature collection aligned with an ArcGIS Online (AGOL) backend is working well for BOPRC. Expanding this concept appears to be the most logical, practical way forward as many RCs are already using elements of this solution. However, several issues remain. While Survey 1,2,3 looks like the obvious data collection preference, options for data storage/ownership and sharing are less clear, some of which will require trouble shooting during the implementation stage. Individual or shared data ownership between RCs and MWLR, which could even be administered by the National Biocontrol Collective (NBC), still needs to be discussed further. Regardless of the data storage/ownership model, an Application Programming Interface (API) will be required to feed a relational database for MWLR's specific data analysis requirements, and data security protocols will need to be addressed here if publications result. Ongoing administrative costs will also need to be addressed; however, as funding from the NBC already pays for the administrative costs of the current biocontrol of weeds Access database that MWLR hosts, these costs can be offset. Also, MWLR have an enterprise agreement with ESRI, meaning that licences for the use of Survey 1,2,3, data cloud storage and AGOL could potentially be provided free of charge to those RCs that currently do not use this service and do not have resources to pay for one. Further investigation is required to confirm this when the number of licences required is known.

6 Conclusions/Recommendations

Use Survey 1,2,3 across RCs nationwide to send data to an MWLR/RC hosted ESRI feature collection(s) that can be shared and analysed in AGOL with the explicit consent of the contributors. An API will be required to feed a subset of these data into an additional

MWLR hosted relational database for further data analysis requirements (see Appendix 2). An Envirolink Tools Grant would be needed to work through the steps required to implement a solution that considers individual RC requirements and constraints.

7 Acknowledgements

I'd like to thank Shane Hona (BOPRC) and Craig Davey (Horizons RC) for ideas and useful comments along with others from RCs that made contributions documented in Appendix One. Scott Sambell (Ethos Environmental) and Sam Stephens (BOPRC) provided me with demonstration material looking at the system that has been developed for EBOP. I would also like to thank MWLR colleagues Alistair Ritchie, David Medyckj-Scott, Nick Spencer, Brandon Whitehead, and Jo Cavanagh for input into potential shared database solutions.

Appendix 1 – Regional Council feedback

Council	Contact	Email	Currently using	Recording method	Storage method	Sharing/ Analysis methods
Auckland Council	Holly Cox	Holly.Cox@aucklandcouncil.govt.nz	We use Collector (now called ArcGIS FieldMaps for map-centric data visualization and collection) and Survey 1,2,3 (more for form-centric data collection).	FieldMaps and Survey 1,2,3 + MWLR forms	ESRI cloud?	Field maps app? + records from MWLR
Bay of Plenty Regional Council	Shane Hona	Shane.Hona@boprc.govt.nz	We at Bay of Plenty Regional Council are using our ESRI based GeoPest app to record all biocontrol releases and inspections. In addition, we have loaded all historic biocontrol releases in our region to this app, so that all our biocontrol data is in one place and can be accessed while out in the field. We store BC release sheets, site maps and photos and permissions to do releases on our server.	Survey 1,2,3 + MWLR forms (combined with ArcGIS Online (AGOL) and called GeoPest)	ESRI cloud + MWLR release sheets, maps and photos, permission on a local server	AGOL + records from MWLR
Environment Canterbury	Laurence Smith	Laurence.Smith@ecan.govt.nz	Environment Canterbury record releases on a paper form (Landcare Research) at present. These are loaded into Records Manager (TRIM). We do have the capacity to record these via the Collector app and download to an existing database from which we can report statistical data via PowerBI. We will be looking into this.	MWLR forms	Records manager (TRIM)	Extraction of data from MWLR forms into spreadsheet at present, or can use PowerBI
Environment Southland	Jolie Hazley	Jolie.Hazley@es.govt.nz	We record field data and releases on the Landcare forms, these are loaded into LRIS along with other notes e.g., Landowner info etc. Our sites are also marked in field maps/ArcGIS. We would like to move this to a survey 123 type system but would need to ensure it links up with all our systems. Room for improvement at our end. Has been contracted for years but now doing it inhouse so may change things…. unless nationally we do first.	MWLR forms	IRIS (includes additional notes e.g., Landowner info)	Desktop only field maps/ArcGIS
Greater Wellington Regional Council	Casey Bannon	Casey.Bannon@gw.govt.nz	GWRC record releases and transfers on a spreadsheet then have the information transferred to ArcGIS. The data is only available on the desktop application. We also retain Landcare forms, photos, maps etc. in our shared filing system.	MWLR forms	MWLR forms, maps, photos on in-house shared filing system	MWLR data transferred to spreadsheet then to ArcGIS

Council	Contact	Email	Currently using	Recording method	Storage method	Sharing/ Analysis methods
Hawkes Bay Regional Council	Darin Underhill	Darin@hbrc.govt.nz	Currently we GPS release sites which are then entered into a Hawke's Bay Regional Council database called Clover. These sites can then be looked up on ArcGIS.	MWLR forms	"Clover" database	ArcGIS
Horizons Regional Council	Jack Keast	Jack.Keast@horizons.govt.nz	We have all our release sites recorded using Landcare's release sheets. We also have all our sites, releases or natural spread sites that we have found on an ArcGIS based app/layer. This layer would be easily shareable if needed.	MWLR forms	ESRI cloud	ArcGIS
Marlborough District Council	Brent Holms	Brent.Holms@marlborough.govt.nz	Here at MDC we record our release sites on ArcGIS which feeds through to the field maps app. Release sites & site visit details are also recorded on our biosecurity database (similar to IRIS). We also save Landcare release forms, photos, maps etc on our file management system.	MWLR forms	In-house database similar to IRIS + MWLR forms, maps, photos on in-house filing system.	ArcGIS
Northland Regional Council	Joanna Barr	joannab@nrc.govt.nz	Paper form submission. Data on a spreadsheet. The aim is to be able to turn it into some sort of reporting and spatial tool for mapping/tracking. It is still a work in progress, and an extraction from your existing database would certainly help fill in the gaps. The spreadsheet has two sheets, one summarising agent status, and one is focused on site status. Both are important for reporting and information sharing for us, and even just keeping pace with the number of species and agents at different stages around the country. The actual monitoring data is stored in an adhoc way, and it would be so much the better if it could be logged against a spatially linked database entry.	MWLR forms	Spreadsheet database being developed with agent and site status sheets.	In progress

Council	Contact	Email	Currently using	Recording method	Storage method	Sharing/ Analysis methods
Otago Regional Council	Richard Lord	Richard.Lord@orc.govt.nz	Otago Regional Council are currently using a combination of ArcGIS and ArcGIS Survey 123 app to collect Biocontrol field data. We are currently updating our field app to include a full list of Biocontrol agents likely to be observed in Otago, as currently we only have a select few available. ORC field staff document biocontrol releases on the MWLR Release sheets and also record the GPS coordinates in ArcGIS. ArcGIS allows for simple map viewing, strategic work planning for additional releases, and reporting. In terms of sharing this information, anything compatible with ArcGIS would be advantageous.	Survey 1,2,3 app + MWLR forms	ESRI cloud?	ArcGIS
Taranaki Regional Council	Mike Beech	Mike.Beech@trc.govt.nz	At Taranaki, we have an excel spreadsheet that we have recorded all our releases on. From there we have loaded some sites into IRIS and some into our Pest Mapper app which records all our weed information. In addition to this we also use the field data sheets that Landcare provides.	MWLR forms	Excel spreadsheet + some data on IRIS	Pest Mapper app
Tasman District Council	Lindsay Barber	Lindsay.Barber@tasman.govt.nz	We use ESRI ArcGIS collector app loaded on to a Samsung galaxy A32 phone. The app is a bit cumbersome in the field, but it is accurate and back at the office, on the desktop version we can use filters to home in on a particular species.	Survey 1,2,3 on Samsung galaxy A32 - note: may need tablet to be practical + MWLR forms	ESRI cloud?	ArcGIS
Waikato Regional Council	Hamish Hodgson	Hamish.Hodgson@waikatoregion.govt.nz	At Waikato we are filing the release sheets from any release in our Discover database and recording the site in Iris. However, we are meant to be moving to ESRI based, ArcGIS field maps and survey 123 app system very similar to BOP's system for all our direct control work and biocontrol work in the 2022/2023 financial year.	MWLR forms	Discover database and IRIS but moving to ArcGIS like BOPRC's	In progress?

Appendix 2 – Proposed model