

# Spatial Technology Supporting Collaboration in Endangered Species Recovery Efforts



*Whio Forever*

**Presenter:**

**Martin Slimin**

**New Zealand Department of Conservation**



Department of Conservation  
*Te Papa Atawhai*



513km

esri

Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors



513km

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Source: Esri, GEBCO, NOAA NGDC, and other contributors







# New Zealand

Last major landmass to be colonised by humans as part of the Polynesian migration

Isolation has led to a high level of endemism in its biodiversity (approx. 80%)

Only 3 native terrestrial mammal species all bats one of which is extinct

Arrivals of humans brought invasive predatory mammals (inc. rats, possums, mustelids, humans)

Over 50% of New Zealand's native species are now extinct

# Whio

- Blue duck, kowhiowhio (*Hymenolaimus malacorhynchos*)
- Endemic to New Zealand
- 2500 left with IUCN classification of Endangered
- 1 of only 3 spp. Worldwide which lives year round on fast flowing rivers
- Ideally adapted to its high energy environment
- Main agent of decline is predation from mustelids in particular stoats
- Dependence on fast flowing rivers make it unsuitable for conservation in captivity or on predator free islands



# Whio



# Whio Forever

- DOC no longer able to halt the decline in biodiversity on its own and is actively seeking partnerships with community, NGOs, business and tangata whenua (indigenous maori)
- Lead to partnership with Genesis Energy under the branding of Whio Forever
- Genesis recognised the value of whio as an indicator of the health of the river ecosystems on which it was dependant for hydro generation and as a taonga (treasure) to its staff and customers
- Not only did this enable Genesis to demonstrate social and environmental responsibility, but also make financial sense



# Whio Manager Application

- Whio Forever understood from the outset that having quality information on population and predator dynamics was key to species recovery
- Historically data was fractured with questionable accuracy and often anecdotal
- Led to the development of the Whio Manager app
- Whio is now the of New Zealand's endangered species with timely accurate and consistent picture of its managed population

# Requirements

- Must be spatial
- Must be built in a way to minimise costs, to retain funds for predator control
- Must be openly accessible and free to all involved in whoio conservation
- Must be able to utilise in field data capture in a prolonged disconnected environment and be capable of accepting traditional paper records
- Must be intuitive to use and provide data of validated accuracy for research purposes

# Data Supported

- Bird observation, survey, territory and recruitment data
- Bird capture, release and mortality events
- Nest inspection and egg lift data to support captive hatching programme
- Predator control management data
- Field worker tracking for auditing purposes



# The Geeky Stuff

- Database ArcGIS 10.2.2 SDE on SQL Server
- Served using ArcGIS Server 10.2.2 / 10.3
- Web application built on Latitude Geographics Geocortex Essentials 3.15.1 and Viewer for Silverlight 1.10
- ArcGIS for Windows Mobile 10.1 with custom trap check extension
- ArcGIS Runtime SDK for Android 10.2.6

# Server

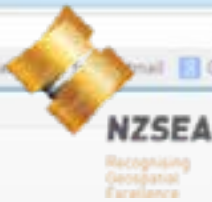
- Required a split between 10.2.2 which aligns with the rest of infrastructure and 10.3 to support a combination of Windows Mobile and Android
- Dates, dates, dates aaaaaaaggghhhh!!!!!!

# Geocortex Viewer

● <http://maps.doc.govt.nz/richmapviewer/?Viewer=Whio>

● Enables a rich user experience with incorporated security, business logic and data validation, configurable without the need for bespoke development

● Silverlight enabled a required richness not currently available through HTML5, but has limited browser / platform support





# ArcGIS for Windows Mobile

- Largely configurable through Windows Mobile Project Centre
- Bespoke trap management extension easily incorporated and cheap as chips
- Windows Mobile devices flakey and unreliable, and managing a distributed fleet of devices
- Configurability and cheap development, enabled iterative development until application requirements were completely understood before committing to bespoke Android development

# ArcGIS Runtime SDK for Android



- Bespoke developed native app
- Not cheap
- Improved user experience, device reliability / performance and self managing
- Only trapping at this stage



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# Spatial Intelligence

- Use of SQL geometries enable direct querying of SQL tables removing some limitations of ArcGIS server and rest services
- Form not map centric mobile apps with spatial brain increases field efficiency and business logic
- A spatial driven security model enables single central dataset nationally with permissions defined geographically not by attributes on a table



