

SILVER GULLS (*CHROICOCEPHALUS NOVAE-HOLLANDIAE*) AS VECTORS FOR INVASIVE OLIVES (*OLEA EUROPAEA* SSP. *EUROPAEA*) ONTO PENGUIN ISLAND, SHOALWATER BAY, ROCKINGHAM

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INTRODUCTION

Gulls are typically opportunistic scavengers. Omnivores with a diverse diet that often includes seeds and fruits, they can be effective dispersers of coastal plants and important vectors for movement of plant material, particularly to offshore Islands (Green 2016; Calvino-Cancela 2011). They have long been known to be effective carriers of weed seed (Gillham 1956) and as such have often been noted as significant vectors of invasive plants onto offshore Islands (Abbot and Black 1980; Morton and Hogg 1989; Green 2016; Calvino-Cancela 2011). Herring Gull (*Larus argentatus*) have been recorded as dispersers of common oats (*Avena sativa*) and Barley (*Hordeum vulgare*) to the Welsh Islands (Gillham 1956) and American Herring Gulls (*L. smithsonianus*) and Ringbilled Gulls (*L. delawarensis*) have been recorded as major vectors for spread of invasive plants mostly broad leaf herbs and grasses onto the Islands of the Great Lakes, Canada (Morton and Hogg 1989). In Australia, Pacific Gulls (*L.*

pacificus) have been reported as vectors for spread of two invasive shrubs, Boxthorn (*Lycium ferocissimum*) and Mirror Bush (*Coprosma repens*) between the Bass Strait Islands (Calvino-Cancela 2011).

Dispersal of Olive seed to Penguin Island

The thousands of woody fruits voided from Silver Gulls onto the board walk at Penguin Island in Autumn 2014 (Figure 1) were initially thought to be from the native grape (*Nitraria billardierii*) but once seed was collected, potted up and had germinated it was evident the fruit was actually from Olives. It has been noted that gulls consume Olives where they grow in their native range and Herring Gulls have been documented as being responsible for the spread of viable seeds from orchards on the Croatian mainland to small offshore islands (Spennemann and Allen 2000). This record of a mass dispersal event of Olive seed from mainland WA to one of Perth's offshore islands is of concern given the invasive



Figure 1. Olive seed on the boardwalk at Penguin Island.

nature of the species in southern Australia and the impacts Olives can have on biodiversity (Spennemann and Allen 2000; Crossman 2002).

The impacts of Gulls as vectors for invasive plants onto Perth's offshore islands is compounded by the gregarious nature of these birds and their increasing population densities associated with increasing volumes of human refuse on the mainland. Silver Gulls were not recorded nesting on Penguin Island until the early 1960s and by the 1990s an estimated 3000 pairs of breeding birds were recorded on the Island (Department of Conservation and Land Management 1992). With the colony still expanding, the mass dispersal of Olive seed to Penguin Island by Silver Gulls is one example of the impacts increasing population densities of these birds might have on Perth's offshore islands.

It is only relatively recently that Olives have become established in bushland around Perth and south-west Australia (Hussey *et al.* 2007). Dispersal by birds from plantations and ornamental street trees in the suburbs of Perth appear to be the primary cause. Olives are increasingly used as ornamental amenity trees in newer coastal suburbs in close proximity to the Islands in Shoalwater Islands Marine Park and these plantings are the likely source of seed we observed being dispersed en masse to Penguin Island via Silver Gulls.

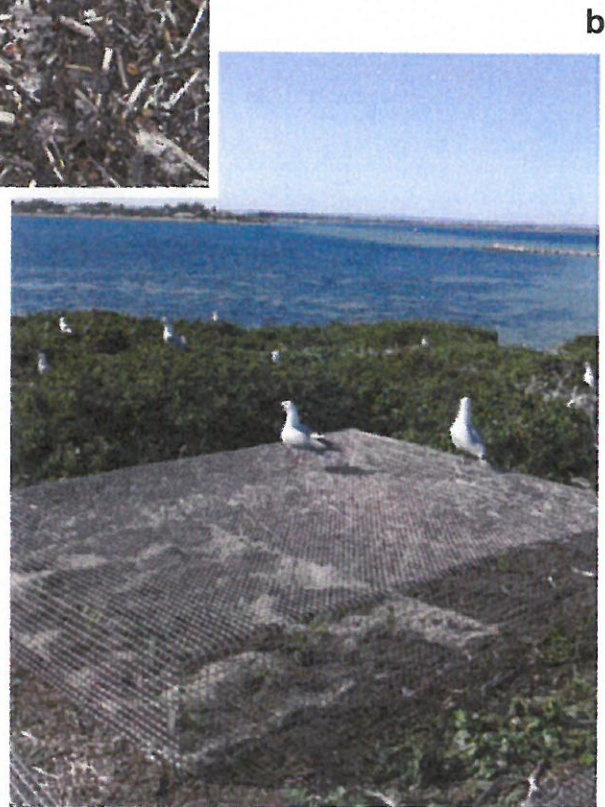
Fate of Olive seed dispersed onto Penguin Island

At the same time as Olive seed appeared on the board walk, restoration trials using weld mesh cages to protect planted tube stock and seed from Silver Gulls were being established on Penguin Island. These trials were



a

Figure 2. a) Olive seed voided into restoration plots, July 2015 b) Silver Gulls perching on weld mesh cages.



b

subject to monthly monitoring from March 2015 to December 2015. Throughout the course of the trials large numbers of Silver Gulls were continually perched on the weld mesh cages, voiding Olive seed into our restoration trials and providing an opportunity to observe the fate of Olive seed brought onto the



Figure 3. Olive seed germinating in restoration trials, August 2015.

island (Figure 2a & b). While hundreds of seeds were voided over many months only three germinants were observed (Figure 3) and all died within one month of germination. A study on the recruitment dynamics of *Olea europaea* (Rey and Alcantara 2000) found that germination was very low in sites with little or no shrub cover and that the effects of water stress was the main determinant of seedling survival, with nearly 100% mortality in some years. The sites

we were observing were open with little vegetation cover possibly accounting for the very few germinants observed. In addition our observations were made over the winter of 2015 one of the driest on record for the Perth metropolitan area (Commonwealth of Australia 2016). This probably accounted for lack of seedling survival. In wetter years seedlings may possibly survive and go on to establish mature plants. The use of Olives as street trees and in amenity plantings should be reconsidered given their invasive nature and the increasing population densities of Silver Gulls, a major vector for spread.

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