

Eastbound and Down

Warming Oceans Affect on Ecosystem Functionality (With an East Australian Current Context)

Hunter Mayo and Åsa Söderqvist (Climate Change Leadership - Power, Politics and Culture 2018)

Driver: Changing climatic patterns and production due to overall global temperature increasing from anthropogenic influence.



Sea urchin barren [1]



Tasmanian Kelp Forest [2]

Impacts: Due to increasing ocean temperatures and overall salinity, the East Australian Current (EAC) has acted as a primary range extender for long spined sea urchins into Tasmania waters, eating kelp forests, while their only natural predator (large rock lobsters) loses valuable habitat and can't grow as large due to warming oceans. Furthermore, the warming oceans create higher fecundity rates, which also contributes to less large specimens as the raw population is higher. As these urchins create 'barrens', valuable marine environments are permanently altered, resulting in lack of vital nutrient production and habitat for the native species within the ecosystem.

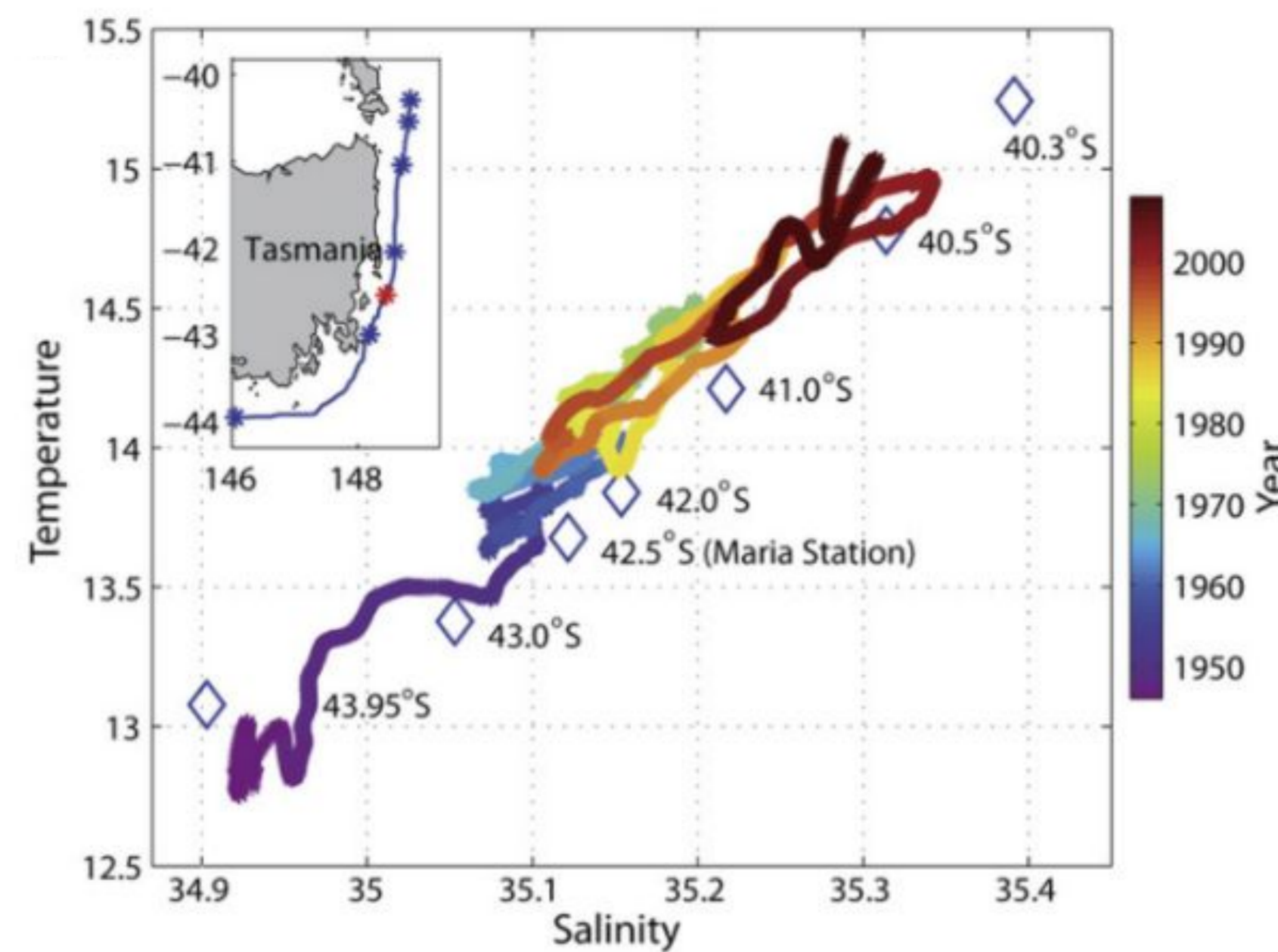


Figure 1: Changes in temperature and salinity off Maria Island (red star on the map) 1944-2010 [Johnson, C.R., 2011].

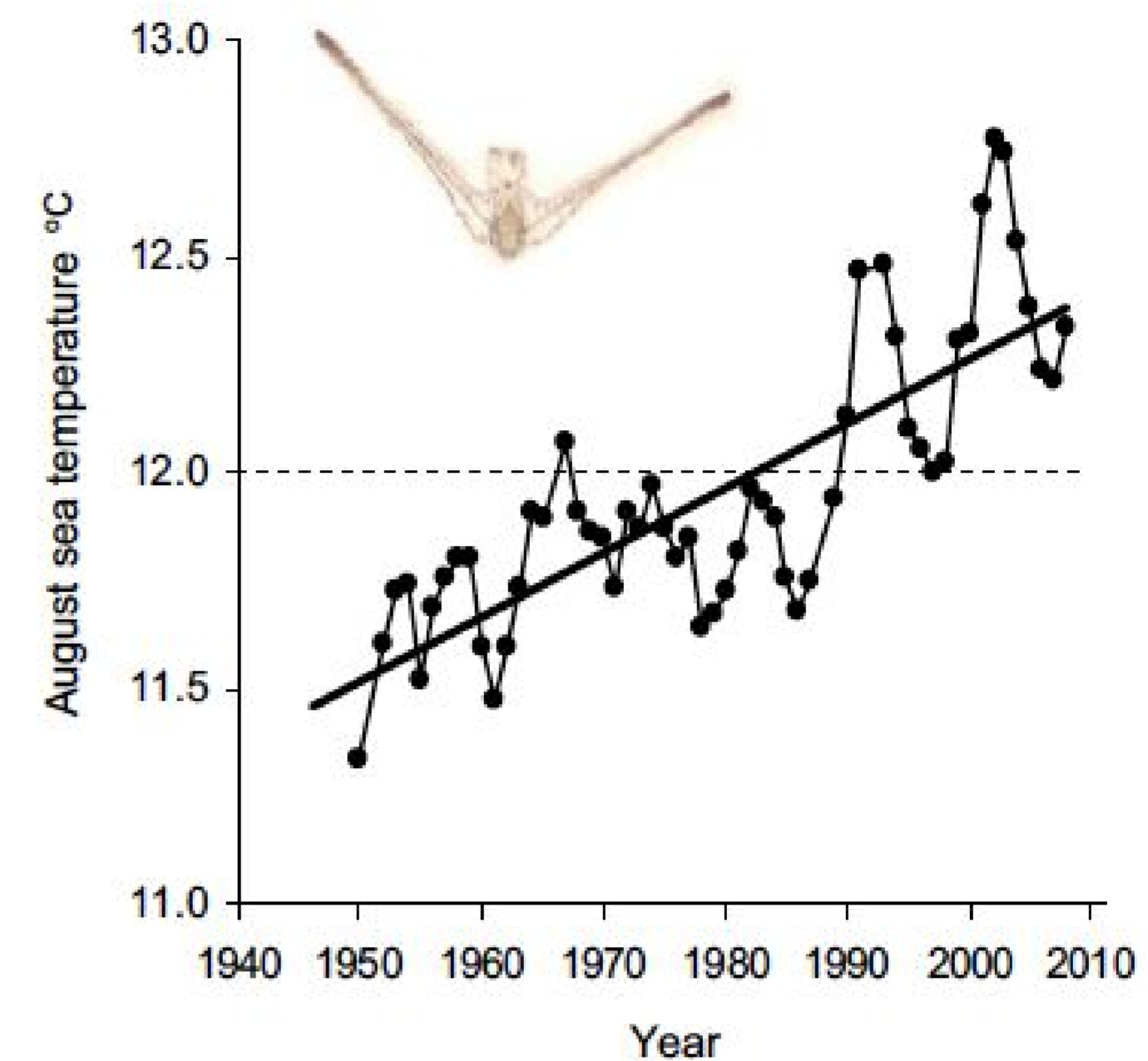


Figure 2: Changes in winter temperature in coastal waters of eastern Tasmania 1950-2008 [Ling, S.D. et al,].

Figure 1 and Figure 2 show the rising sea temperatures at the Tasmanian east coast during the last decades. The horizontal line at 12° C in Figure 2 indicates the minimum temperature for successful development for the long-spined sea urchin larvae. The temperature now exceed 12°C in much of the coastal water. The warming waters also add an increase to the overall salinity, further changing the ecosystem's functionality.

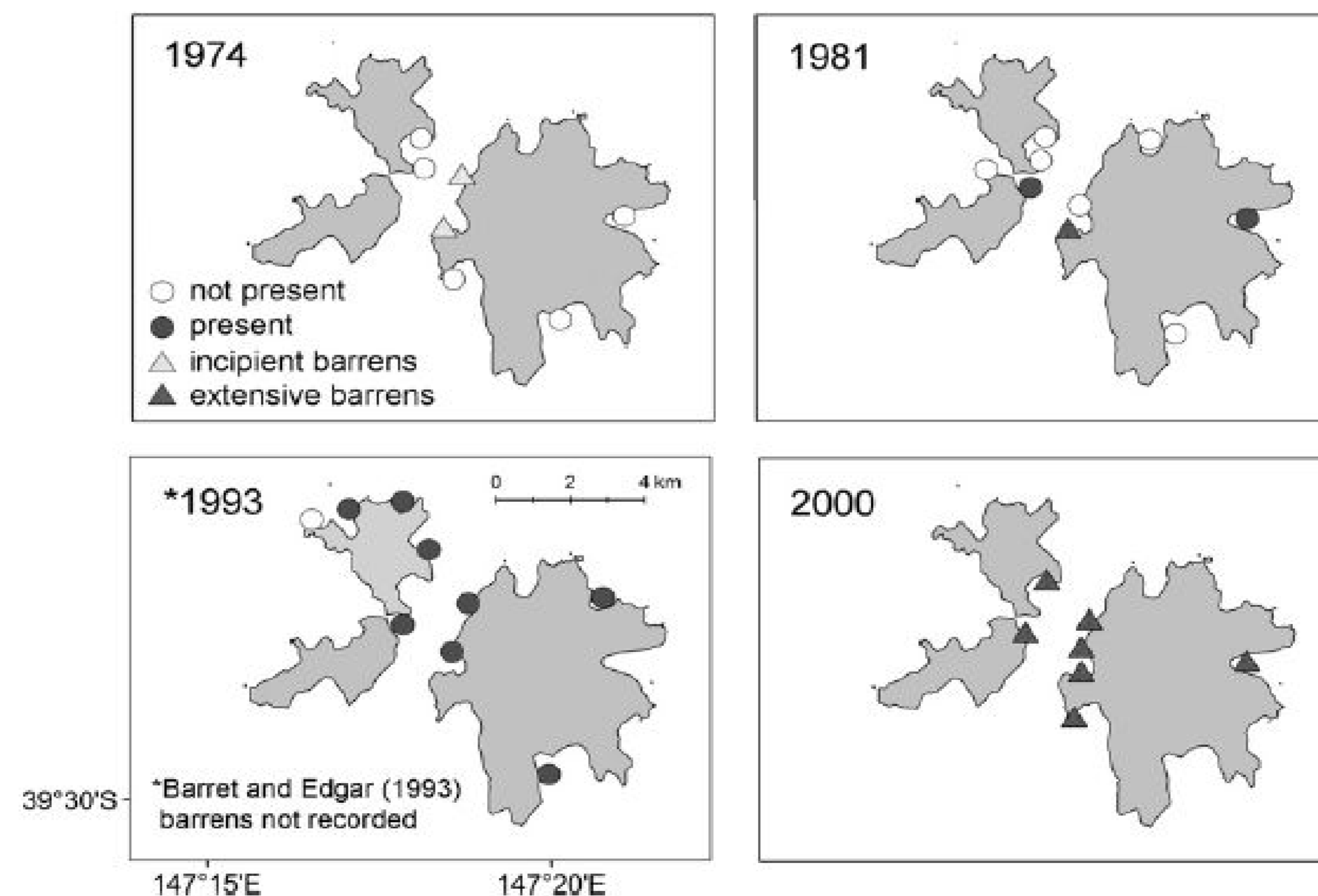


Figure 3: Distribution of long-spined sea urchin and barrens in the Kent Island Group which is located north of Tasmania [Johnson, C.R., 2011]

In Figure 3 an expansion of the long-spined sea urchin and the increase of their barrens during the last 40 years is evident. These barrens have resulted in a large decrease to biodiversity held within, the affected areas.