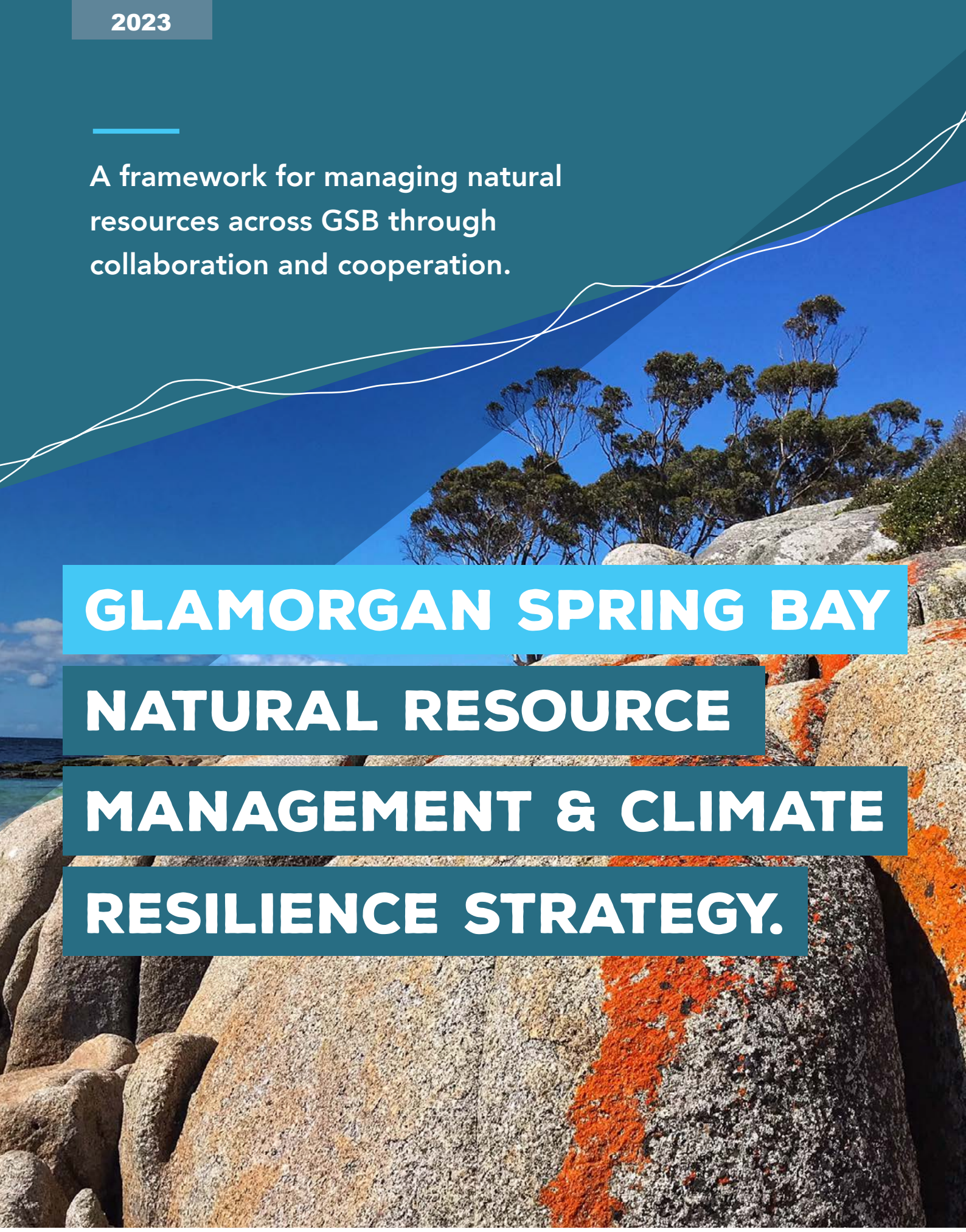
2023

A framework for managing natural resources across GSB through collaboration and cooperation.



GLAMORGAN SPRING BAY NATURAL RESOURCE MANAGEMENT & CLIMATE RESILIENCE STRATEGY.

GLAMORGAN SPRING BAY COUNCIL

LANDSCAPE RECOVERY FOUNDATION

Photo – Rhylla Morgan

Acknowledgment of Country

Glamorgan Spring Bay Council acknowledges the palawa/pakana (Tasmanian Aboriginal) community as the traditional and original owners of the skies, land and waters of lutruwita/trouwunna (Tasmania) and forward our respect to their elders both past and present. Glamorgan Spring Bay Council acknowledges their continuing connection to the skies, land and water of lutruwita/trouwunna.

Other Acknowledgements

Glamorgan Spring Bay Council wishes to acknowledge and thank the East Coast Catchments Steering committee and all the community groups, individuals, stakeholders and council staff who have taken the time to provide input into this strategy.

Council would also like to acknowledge Rhylla Morgan (cover photo), Alan Morgan, Stephen Bussey, Fiona Walsh, Eve Lazarus, Mel Kelly, Jane Wing, Nick Fitzgerald, Robyn Moore, Hayden Dyke, Jim Mulcahy, Jordan Edmeades, David Tucker, Bridget Hiller, Nigel Palfreyman, Eric Woehler, Billy Rowe, Gerald Kraft – Tasmanian Herbarium, Simon Gove -TMAG, Josie Kelman, Howard Colvin, East Coast Primary Producers, Department of Natural Resources & Environment (DNRE), Tasmanian Fire Service (TFS), GSBC, and James Cook University who contributed some of the wonderful images in this document. Thanks also to Nick Fitzgerald for use of his natural values mapping and to Di Bricknell for developing the East Coast Catchments logo.

East Coast Catchments

Executive Summary

This strategy provides an overview of the Natural Resources of the Glamorgan Spring Bay municipality, the pressures on those resources and priority actions for their management. Natural Resource Management (NRM) is about caring for our land, waterways and the plants and animals that inhabit them. The strategy provides a framework for cross-tenure collaboration and cooperative action over the next five years. It outlines common goals, actions and targets to provide strategic direction for Glamorgan Spring Bay Council and other stakeholders to work collaboratively to manage natural resources across GSB.

Located on Tasmania's east coast, the Glamorgan Spring Bay (GSB) Local Government Area (LGA) extends over approximately 2,600 square kilometres. It is bounded by the Denison River in the north and the base of Bust Me Gall Hill in the South, the ridgeline of the Eastern tiers in the West and coastline dotted with beaches, inlets and islands to the east. The area includes three major water catchments, the Prosser, Little Swanport and the Swan Aspley, which provide a range of freshwater, estuarine and coastal environments including internationally significant Ramsar wetlands, marine reserves and Maria Island and Freycinet National Parks.

The major influencing pressure on the sustainability of all natural resources is climate change. There are also many other pressures such as habitat loss, soil degradation and erosion, pollution, the spread of invasive pests, and natural disasters particularly floods and fires. All these known pressures are exacerbated by climate change and the predicted scenarios of higher emissions. It is for this reason that this strategy focuses on the management of natural resources and building resilience under a changing climate.

The region's natural resources are described and grouped into five themes in this strategy. These themes are cultural landscapes, water, land, biodiversity, and people. For each theme an overview of the natural assets is provided, key threats are outlined, and goals and actions proposed over the next 5 years. Progress will be evaluated against measures for success.

Key objectives are to: improve our understanding of cultural landscapes and care for country; improve or maintain the condition of freshwater, estuarine and coastal ecosystems; improve land condition and management outcomes to facilitate long-term sustainability and to maintain and improve biodiversity.

The document recognises the important role that people play in managing natural resources and aims to incorporate regional community wellbeing into agricultural and natural area management programs to improve climate change resilience.

The reader is invited to find out how to get involved, to play a part in looking after our natural resources and help build resilience within the community and the natural environment in which we live.

Contents

Care for **Country**

Country, community, culture – existence.

Country is at the heart of it.

The heart of a healthy community.

Peter Macdonald

Photo - GSBC

Whelk. Photo - GSBC

A landscape shaped by culture

Message from the Mayor

I am very pleased to present Glamorgan Spring Bay Council's Natural Resource Management (NRM) & Climate Resilience Strategy, as part of our ongoing collaboration with our communities to value, manage and improve our natural resources.

Land management is not a new concept in Glamorgan Spring Bay. The Tasmanian Aboriginal people of the Paredererme nation were the first land managers on the east coast, using traditional practices such as fire to shape the landscape. Today's Aboriginal communities retain strong connections to the land, water and skies. It is important that cultural landscapes are recognised and cared for, and that we continue to build our understanding of Aboriginal culture and practices.

The farming, fishing and forestry industries in our area have influenced the landscape. Many families have worked these lands and waters for generations. Their practices offer insights that can help improve the ways we manage and care for our resources as pressures such as climate change increase.

NRM is about people working together to manage the landscape. The cultural values, land, water, soil, plants and animals. Our region has a long history of proactive Landcare and NRM. It is vital that we all continue to work together to improve the long term-sustainability of our environment and the industries it supports, and become leaders in addressing climate change and building resilience at a local level.

This strategy acknowledges the previous NRM work that has been done in Glamorgan Spring Bay, bringing it together with a contemporary climate change focus, and providing a framework for cooperation and collaboration.

With tourism and primary production at its heart, our municipality continues to have strong links to the natural assets that underpin our lifestyle and economy.

At Glamorgan Spring Bay Council we celebrate the knowledge, skills and leadership of our local community. We are lucky to have a community passionate about our natural environment for its intrinsic value, as well as the lifestyle and economic opportunities it supports. Many people volunteer their time to look after our reserve areas which are under increasing pressures as people and pets share the coastline with our special plants and animals amid the impacts of a changing climate. Our farmers are working to improve land management practices, and our industries and communities are striving to reduce carbon emissions and single use plastics.

We look forward to working together for a sustainable future.

Mayor Cheryl Arnol
Glamorgan Spring Bay Council

Background

What is Natural Resource Management?

Natural resource management (NRM) is about looking after our natural assets, caring for our land, soil and waterways, and our plants and animals, so they stay healthy and productive. It is about people working together to manage our precious resources, now and into the future.

Our natural resources are assets. They include air, water, rocks, soil, plants, fungi, animals and micro-organisms. These resources are all interconnected, forming landscape scale ecosystems such as river catchments, as well as tiny micro ecosystems such as the area around a plant or under a rock. At any scale, whether a pristine natural landscape, a much-loved beach, an urban park or a productive farm, the living organisms within a system depend on its physical, chemical and climatic characteristics. For systems to be sustainable in the long term we need to recognise, maintain and/or restore these complex relationships.

Who helps manage our natural resources?

We all have a shared responsibility to look after our natural assets.

We are all part of our environment and rely on natural resources to survive. We all need food, water, clean air, and places to live and play. Natural areas with high biodiversity help to regulate our environment. Trees and plants provide shade and shelter from sun, wind and rain. They help stabilise and filter waterways, and capture soil carbon and moisture.

We rely on our natural resources to support our economy, for our health and wellbeing, and to support our lifestyles. Our natural areas provide important opportunities for recreation, to explore and understand nature, and for us to connect with our environment and with each other.

Primary producers and foresters, tourists and visitors, schools and government, land managers, businesses, community groups and individuals – we all have a role to play in looking after our natural resources.

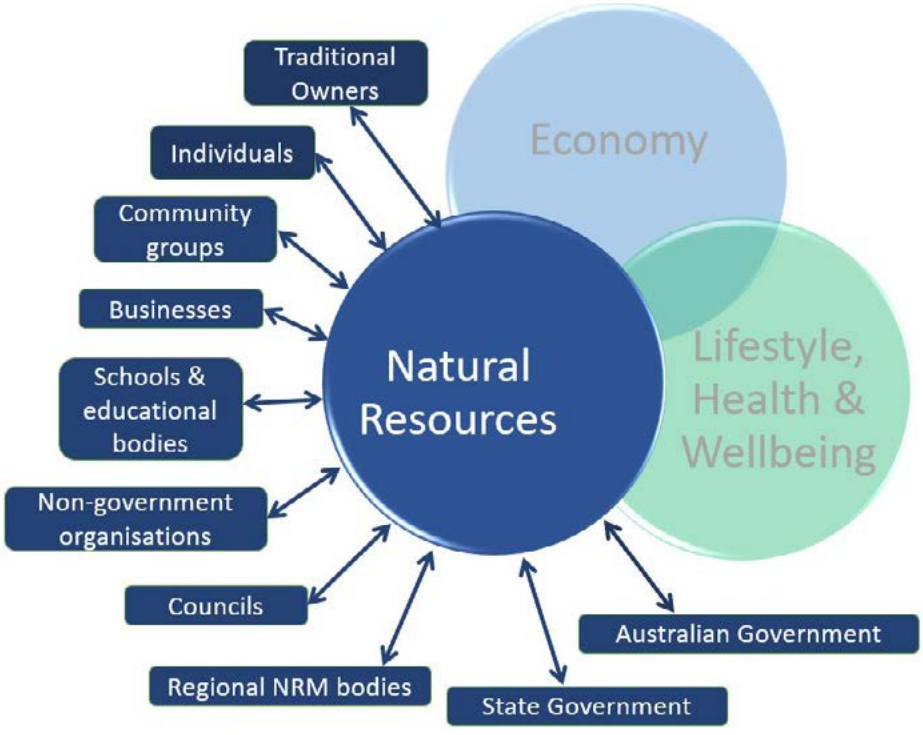


Figure 1– Managing our natural resources is a shared responsibility. Our natural assets support our community and underpin our economy and our lifestyle.

Glamorgan Spring Bay's Natural Resource Management (NRM) Strategy

Brief history of NRM in Glamorgan Spring Bay

Glamorgan Spring Bay has a long history of natural resource management, with community members contributing many volunteer hours through groups like Landcare, Coastcare, Bushcare and Waterwatch. In 1992 the Spring Bay Landcare Group was formed and began working with community, businesses, land holders and land managers to work toward the sustainable management of natural resources. The willow removal project on the Prosser River was a major achievement and a great example of what could be achieved with people working together. Discussions began to focus around how to coordinate efforts, raise awareness of issues and encourage collaboration. In 1995 the Spring Bay Landcare Strategic Plan was developed reaching from Spring Bay to Little Swanport. In 1998, landholders of the Denison catchment met with representatives from the Bicheno Earth & Ocean Network and Eastcoast Regional Development to discuss land management issues and began work on the Denison Catchment Plan. By 1999, the Glamorgan Spring Bay Landcare Management Committee was in place and working with Landcare groups across the LGA. Support from Council and external funding programs enabled planning and more strategic collaborative on-ground works. In 2005, GSB Landcare Committee became the GSB NRM Committee to reflect the Tasmanian NRM Framework and resource delivery nationally. As an S24 Sub-Committee of Council, the GSBC NRM Committee in conjunction with Council's NRM Department achieved an enviable reputation for its work.

For over 30 years significant works have been undertaken including weed control, revegetation, and fencing to protect remnant vegetation to allow natural regeneration and habitat recovery. A number of important reserves on private land have been established through private reserve programs. Resources to raise awareness of issues such as nesting shorebirds and other threatened species were also developed for the community. Key achievements have been the development of collaborative programs and partnerships including working with the Department of State Growth to improve the management of roadside weeds and cooperative weed control programs for high threat weed species such as serrated tussock.

A number of plans including the Prosser, Little Swanport and Swan Aspley Catchment Management plans, and reserve management plans for council managed lands have been developed to guide the sustainable management of resources in and around Glamorgan Spring Bay. These plans are important reference documents, providing background, resource descriptions, and a level of detail that has helped inform this strategy.

Cygnet River. Photo - Alan Morgan

The purpose of this strategy

This draft NRM and Climate Resilience Strategy is not intended to replace existing plans. It is designed as an overarching summary of the values, threats and issues outlined in these documents. The strategy provides a framework for cross-tenure collaboration and cooperative action over the next five years. It outlines common goals, actions and targets to provide strategic direction for Glamorgan Spring Bay Council and other stakeholders to work collaboratively to manage natural resources across GSB. The document is also a mechanism for attracting funding. The strategy aims to assist landholders, land and water managers and the broader community manage natural and productive systems to improve sustainability, maintain vegetation buffers, prevent biodiversity loss and build climate change resilience.

How this strategy was developed.

The Landscape Recovery Foundation was engaged by Glamorgan Spring Bay Council to deliver NRM Services for GSB including the development of this strategy.

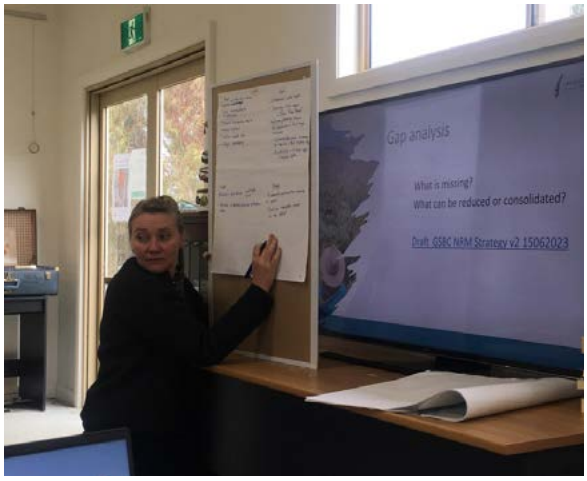
As a first step the Landscape Recovery East Coast Catchments Steering Committee was set up to assist in developing the strategy by providing community leadership, local expertise, advice and strategic direction and review. The group is made up of local community members with a depth of experience and knowledge of NRM and representing a range of community interests in GSB. The committee helped to identify stakeholders, community groups and their interests, key issues for action. The group also provided a sounding board for ideas and provided feedback during the development of this document.

A contemporary review of existing NRM planning documents was undertaken and a communications and engagement plan developed to guide stakeholder and community input. In late 2022 and early 2023 preliminary discussions were held with a number of community groups and stakeholders in order to identify key issues and opportunities to inform this document.

It is envisaged that this draft will form the basis for further discussions with community and stakeholders prior to finalisation of the strategy. The strategy aligns with key elements of the Glamorgan Spring Bay Council's Strategic Plan 2020-2029 (See Appendix B).

Using the principles of action learning, this strategy is intended to be a living document with actions planned, implemented, then reviewed and adjusted to ensure the desired outcomes are being achieved. Learnings will be documented and used to improve practices that will assist in achieving these outcomes.

The East Coast Catchment Steering Committee have provided advice and review.



Looking at gaps.

Backroad. Photo - GSBC

Photo - Hayden Dyke

Considering climate change

With climate change, it is forecast there will be an increase in extreme weather events that can result in increased biosecurity risks, flooding, inundation and bushfires. With the increased risks associated with changes in climate, it is more important than ever that we understand the condition of our natural resources and work together to manage our natural systems to improve sustainability and build climate resilience.

Glamorgan Spring Bay

Located on Tasmania's east coast, the Glamorgan Spring Bay (GSB) Local Government Area (LGA) extends over approximately 2,600 square kilometres. It is bounded by the Denison River in the north and the base of Bust Me Gall Hill in the South, the ridgeline of the Eastern tiers in the West and coastline dotted with beaches, inlets and islands to the east.

The area includes three major water catchments, the Prosser, Little Swanport and the Swan Aspley, which provide a range of freshwater, estuarine and coastal environments including internationally significant Ramsar wetlands, marine reserves and Maria Island and Freycinet National Parks.

Glamorgan Spring Bay's resident population of 5012[1] is largely located on the coast, with populations centres in the towns of Orford, Triabunna, Swansea, Coles Bay and Bicheno. Many Tasmanians have holiday houses in GSB and the population swells in the summer months when people from Hobart and Launceston head to the coast, and the tourist season peaks.

GSB has incredible, diverse, natural landscapes, offering spectacular scenery, and supporting a range of ecosystems on land and in water.

A history of varied land uses including Aboriginal land practices, farming, grazing, forestry and nature conservation has led to a montage of natural and modified environments which support a high diversity of species and include a number of biodiversity hotspots.

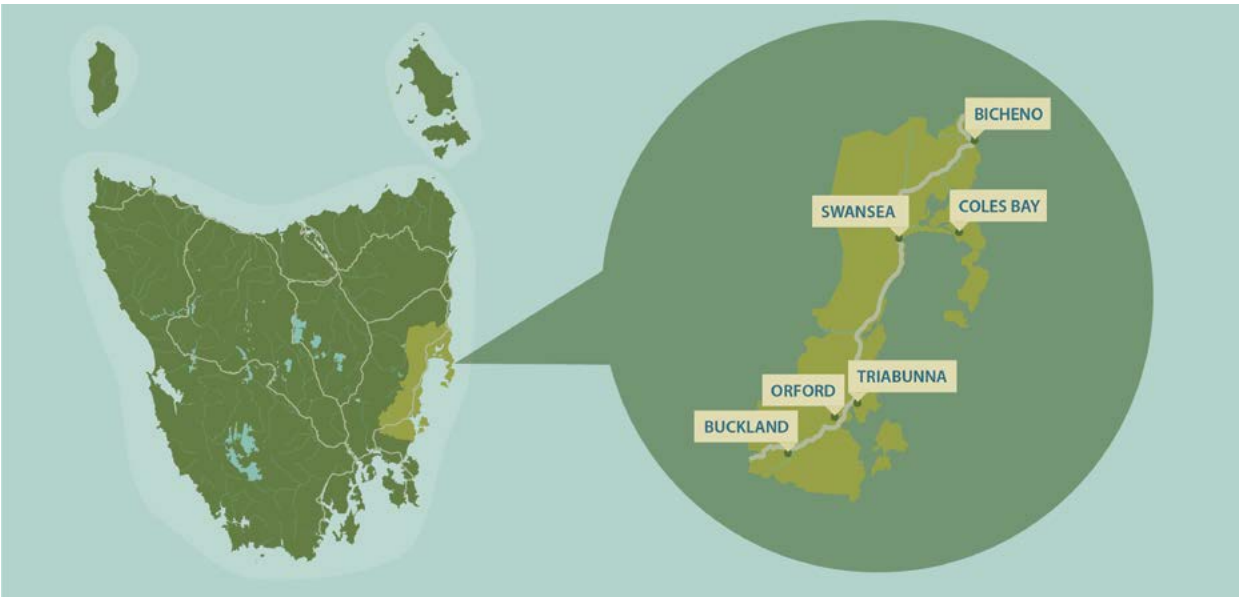
The biodiversity is represented by a diverse mix of native forests, woodlands, remnant grasslands and wetlands and estuarine and marine environments. GSB is home to significant populations of Tasmanian flora and fauna, including some species found only in localised areas.

The major industries are primary production including agriculture, aquaculture and fishing, tourism and associated services, and construction. These industries are driven by and rely on the natural resources of the region. The area has a rich history of cropping and sheep grazing and many families have worked the same farms for generations. In recent years, many farms have diversified into other enterprises such as nut trees and vineyards.

The east coast offers a range of recreational opportunities that are enjoyed by locals and visitors alike, including bushwalking, kayaking, fishing, surfing and boating.

There is still so much yet to be understood about our environment and many species still to be discovered. It is important we work together to maintain and improve biodiversity, not only for the intrinsic value, the ecosystems services, and social and economic value it provides, but also to give ourselves the opportunity to better understand species, and their roles and interactions in our precious ecosystems.

The lifestyles and future prosperity of residents of Glamorgan Spring Bay rely on the conservation and enhancement of its natural resources through sustainable management practices.



1 ABS 2021 Census

A snapshot of our natural assets

Our natural assets underpin our community, economy and lifestyle

263,529
HECTARES
TOTAL LAND AREA

227KM Coastline plus

30 Major Islands

1000+
KNOWN ABORIGINAL SITES

Including shell middens, stone quarries and artefact scatters*[1]

2,519 HECTARES WETLANDS[2]
1,413 KILOMETERS WATERWAYS[3]

82%
NATIVE VEGETATION COVER[4]

78 DIFFERENT VEGETATION COMMUNITIES

16 state listed threatened plant communities

3 federally listed threatened plant communities[5]

39% OF GSB IS RESERVED
102,800 Ha

11% of land is used for FOREST PRODUCTION

19%
OF LAND IS USED FOR AGRICULTURE[13]

7917
DIFFERENT FUNGI, FLORA AND FAUNA SPECIES

4200 Animals

3076 Plants

641 Fungi

Species have been recorded in Glamorgan Spring Bay. More still to be discovered.[7]

245
FUNGI, FLORA AND FAUNA SPECIES OF CONSERVATION SIGNIFICANCE

59 Animals

184 Plants

2 Fungi[7]

*These sites reflect the extent of heritage survey and investigation work that has been carried out within the municipality and do not represent a complete and exhaustive picture of heritage sites or Aboriginal land use in the past

A snapshot of our community

5,012[12]

51% FEMALE | **49%** MALE[12]

4.4%[12]

IDENTIFY AS ABORIGINAL OR TORRES STRAIT ISLANDER

HOW OLD ARE WE

When compared with Tasmania, Glamorgan has a larger percentage of seniors and empty nesters & a smaller number of parents and homebuilders.

- 10% are aged 0-14
- 11 % are aged 15-29
- 14 % are aged 30-44
- 31 % are aged 45-64
- 34% are aged 65+

The median age is 57 years [12]

HIGHEST LEVEL OF EDUCATION

- 17% have a university qualification
- 9% diploma or advanced diploma
- 18% certificate III or IV
- 39% completed year 12

HOW DO WE LIVE?[12]

FAMILIES

- 24% are couples with children
- 65% couples without children
- 11% single parents

HOUSEHOLDS

- 15% people live alone

HOMES

- 53 % people own their home
- 22 % have a mortgage
- 20 % are renting[12]

DWELLINGS

- 53 % are unoccupied

22% OF PEOPLE VOLUNTEER[12]

A snapshot of our economy

$232 MILLION

GROSS REGIONAL PRODUCT in 2021

AGRICULTURE, FORESTRY AND FISHING
MOST PRODUCTIVE INDUSTRY IN 2019/2020

GENERATING
$52 MILLION

JOBS IN 2021
46%
OF THE POPULATION ARE IN THE WORK FORCE

OF THOSE WHO ARE IN THE WORKFORCE

47% work full-time

40% work part-time

5% unemployed and looking for work

8% away from work

ABS 2021

WHERE DO PEOPLE WORK?

IN 2020/21 WHICH INDUSTRIES EMPLOYED THE MOST PEOPLE?

ID Profile 2021

23% Accommodation & food services

14% Agriculture, fishing & forestry

9% Construction

BUSINESS PRODUCTIVITY

Economy ID Profile 20/21

Value added indicates how productive the industry is at increasing the value of its inputs. In 2020/2021 the top contributions

Agriculture, fishing and forestry
$65.7 million

Construction
$27.6 million

Accommodation & food services
$20.9 million

Changes in added value from 2015/16 to 2020/21
Agriculture + 17.85

Aquaculture - 4.4%

Food product manufacturing +1.1%

Our changing climate

Climate Projections and I mpacts for Tasmania

Figure 3 Climate Change Projections and Impacts for Tasmania recfit.tas.gov.au[2]

Climate has a strong influence on our natural resources and how we manage them.

The information in this section is based on the LGA climate profile for GSB developed in 2010 by the Antarctic Climate and Ecosystems Cooperative Research Centre (ACECRC)[3] . Predictions are based on modelling of two different emission scenarios and give some indication of expected changes in GSB. Since these projections were released there have been advances in climate change science. Through the State Government's Climate Action Plan (currently under development) the government will develop fine-scale projections for Tasmania using the latest global climate models.[4]

2 Climate Futures Tasmania

3 ACECRC 2010

4 Climate Change Office 2023

Glamorgan Spring Bay has a temperate, maritime climate with relatively mild winters. Although, like most parts of Tasmania there are microclimates in different areas. The average daily temperature at Orford is around 22°C in January and 13.1°C in July. At Bicheno it is about 21.5 °C in January and 14.1°C in July.

Since the 1950s, in line with other parts of Tasmania, long term average temperatures have risen by 0.1°C each decade. Under the influence of climate change, by the end of the century temperatures are predicted to rise by somewhere between 1.3°C and 3.3°C, depending on the level of emissions.

Along with rising temperatures, there will be a change in the frequency, intensity and duration of hot and cold extremes. Summer days with temperatures greater than 25°C are expected to double with a 4°C increase in temperatures on very hot days in some locations. Warm weather spells are also likely to last longer, increasing from 4-6 days up to 7-11 days. Frost days will still occur occasionally.

According to the ACECRC, ongoing strengthening of the East Australia Current will lead to increases in sea water temperatures which are predicted to have significant impacts on marine and coastal systems. Warmer offshore waters associated with the East Australian Current will also influence temperature and rainfall on the east coast.

The GSB area has no strong seasonal rainfall cycle receiving an average 600-700 mm per year. The rain is primarily delivered by irregular rainfall episodes associated with easterly systems such as low-pressure systems in the Tasman Sea. These systems have usually broken away or cut-off from a main belt of low pressure further to the south of Australia. Rainfall is also supplemented by cold westerly fronts which cross the state at regular intervals. Rainfall is also influenced by the El Niño Southern Oscillation.

Rainfall records for Swansea dating back to 1884 show a declining rainfall trend since that time.[5]

For the municipality there has been a decline in average rainfall and a lack of very wet years since the mid-1970s, and this decline has been strongest in autumn. This decrease was exacerbated by the 'big dry' drought of 1995-2009. Recent years have seen above average rainfall and flooding associated with the La Niña phase of the Southern Oscillation.

With climate warming, higher average annual rainfall is predicted for GSB, with increases of up to 20% in autumn and summer by the end of the century. This increase is likely to be greatest along the coast. The natural variability of the climate will continue. However, projections indicate that in the long-term drought frequency and severity is likely to decrease with the increase in rainfall. Rainfall will tend to be heavier, with an increase in rainfall on wet days, interspersed by longer dry periods and greater extremes. Rainfall brought by rare extreme weather events is also likely to increase.

Increases in temperature combined with changes in relative humidity, wind speeds, clouds and radiation will lead to up to 19% increase in evaporation. Changes in rainfall and evaporation will lead to increases in water runoff and river flows, leading to erosion and/or flooding in high rainfall events. It is predicted that increases in runoff may be greater than 30%.

View of Maria Island. Photo - GSBC

5 Tucker, D. 2023

Effects of climate change

Climate change is a lens that threatens to magnify existing threats to our natural resources. The State of the Climate Report 2022[6] found that Australia's climate has already warmed on average by 1.47 °C since national records began in 1910. Sea surface temperatures have increased by an average of 1.05 °C since 1900, leading to an increase in the frequency of extreme heat events over land and sea.

With predicted increases in the frequency and/or intensity of fires and floods, climate change will influence the Tasmanian landscape. With the shift in climate, the southward movement of weeds, insect pests, and diseases is likely to increase the risk of new species arriving and establishing in Tasmania.

Increased temperatures, fire events and associated changes in fire regimes will benefit some vegetation types and disadvantage others. The disturbance caused by fires also increases the risk of weed spread and establishment.

Rainfall is becoming more intensive, leading to flood events that cause erosion and land degradation, as well as facilitating the spread of invasive seed and plant fragments into natural and productive areas.

While insurance companies and government struggle to fund actions to protect people and property from natural disasters, and to initiate recovery activities afterward, the funding available for protecting and restoring our natural areas remains uncertain. It is important that we acknowledge the increased risk and impacts associated with climate change and act now to prepare for the future and help build climate change resilience through sustainable natural resource management. It is also important that we explore other avenues for funding.

As stipulated under the Climate Change (State Action) Act 2008, Tasmania is in the process of developing a climate action plan to

- Reduce Tasmania's greenhouse gas emissions
- Build Resilience to the impacts of a changing climate through adaptation measures
- Manage climate-related risks and take advantage of potential opportunities from a changing climate.

These aims are considered as part of this strategy.

Bushfire at Dolphin Sands. Photo - Tasmanian Fire Service

Climate-related risks

The GSBC Climate Change Corporate Adaptation Plan (2012) identified four priority risk categories: heat; rainfall; sea level rise & storm surge; and bushfire. In addition, with increases in climate change awareness, there is an increasing expectation within communities and organisations that businesses demonstrate environmentally sustainable practices. Tasmania has a target of achieving net zero greenhouse gas emissions from 30 June 2023.[7] It is becoming increasingly important for all businesses operating in the natural resource management space to meet community expectations and legislative requirements if they are to remain competitive and viable into the future.

6 Bureau of Meteorology and CSIRO (2022)
7 Climate Change (State Action) Act 2008

Climate Risks

Heat

- New invasive weed, pests and pathogen species causing loss of agricultural production and natural habitats
- Heat related illness and mortality in humans, plants, and animals
- Greater frequency and intensity of bushfires
- Increased water temperatures and ocean acidification causing
  - changes in fish species/diversity
  - impacts on biodiversity
  - possible consequences for the fishing and aquaculture industries
  - impacts on the community and the economy
- Increase in the length of dry periods leading to soil loss and erosion during subsequent high rainfall events
- Decrease in the chill hours impacting fruit and nut trees flowering and production
- Movement of species and plant communities; changes in habitat.

Opportunities

- Potential to reduce emissions and develop carbon sinks
- Increase in people and businesses setting up in Tasmania
- To be a leader in preparing for climate change.

Rainfall

- Increased storm frequency and/or intensity causing
  - flood inundation in low lying areas
  - storm damage
- Inability of stormwater and water storage infrastructure to cope with high rainfall events
- More frequent inundation creating human health risks
- Increased freshwater input and siltation in estuarine areas
- Storm water runoff lowering water quality on local beaches
- Increased rainfall and temperature variability leading to potential
  - changes in variety of crops and crop varieties
  - changes in agricultural management practices
  - impacts on the economy and health and wellbeing
- Potential for detrimental environmental impacts associated with rapid changes in primary production practice
- Increased movement of weeds across the landscape
- Primary production losses.

Increases in the frequency and intensity of fire and flood events associated with climate change will increase the risk of erosion and land degradation, as well as facilitating the spread of weeds.

Sea Level Rise and Storm Surge

- Communities and businesses cut off during inundation events
- Damage and degradation of infrastructure – low lying roads, tracks and walkways, stormwater assets, bridges, buildings and facilities, residential accommodation, fencing and farm infrastructure
- Inundation affecting vulnerable natural areas - shore bird feeding and nesting areas, wetlands, salt marshes, estuarine and adjacent vegetation communities
- Changes in coastal processes such as sand accretion and erosion cycles leading to changes in river mouths and/or loss of beaches and habitat
- Shoreline retreat caused by erosion and slumping of shorelines and sea cliffs.

Business

- Need for businesses to change practices to remain viable
- Increased demand for processes and products that reduce CO2 emissions.

Bushfire

- Increased likelihood and intensity of bushfire events
- Impacts on infrastructure – maintenance and replacement
- Changes in vegetation communities and habitat – loss of biodiversity with changes in intensity and frequency
- Loss of vegetation cover and connectivity and an increase in bare areas for weeds to establish
- Potential loss of orchards, vineyards, stock and crops.

Principles for Managing our Natural Assets

According to Vulnerability of Tasmania's Natural Environment to Climate Change: An Overview, the following principles should be applied for managing natural assets against the impacts of climate change:

- Manage and protect well-functioning ecosystems
- Increase protection of habitat – including protecting and restoring terrestrial, freshwater and marine ecosystems
- Reduce the impacts of current threats
- Maintain viable, connected and genetically diverse populations
- Enact active interventions such as restoration and revegetation activities.

Our natural resources

In this section we describe our natural resources, grouping them into themes for undertaking action - cultural landscapes, water, land, biodiversity, and people. Natural resource management is however, integrated in its approach. It works across natural asset types, linking actions to how people use the landscape and resources. We have described each theme and provided goals (what we are trying to achieve), management actions (how we will achieve the goals) and measures of success to help us measure our progress and evaluate outcomes.

Some actions go across the different natural resource themes. These have been allocated to the theme we think is most relevant.

Little Swanport River. Photo - AlanMorgan

Cultural Landscapes

To Care for Country by listening and responding to country, using practices to sustainably manage the land and water, is part of palawa/pakana (Tasmanian Aboriginal) culture, expressing both physical and spiritual connection to country. Traditional ways of living have been passed down through generations and offer insights into managing our landscapes.

Ryan's book Tasmanian Aborigines - A history since 1803[8] describes the approximate boundaries for the nine Tasmanian Aboriginal nations, indicating that the Paredarerme nation occupied the area we now know as Glamorgan Spring Bay. The Paredarerme Nation consisted of ten clans with an estimated total population of between 700-800 people, making it the largest Nation in Tasmania. The term clan refers to the basic social unit representing a group of people known by a particular name. A clan was usually led by an older man, who was a formidable hunter and fighter and referred to as bungana.[9]

The movement of the Paredarerme Nation through the landscape is thought to have been largely based on the seasonal availability of food resources. The nation appeared to be divided into three distinct groups based on the seasonal food sources and on ceremonial practices: the northern group made up of four clans (from Schouten Island through to St Patricks Head) a second group of four clans (from Little Swanport through to the Tasman Peninsula) and the third consisting of two clans (Maria Island and Pitt Water, Risdon). [10]The table below adapted from Ryan 2012, outlines the clans of the Paredarerme Nation and their locations. Eight of the ten clans were located in, or spent time in the Glamorgan Spring Bay region.

8 Ryan 2012
9 Plomley in Ryan 2012
10 Ryan 2012

Clan	Clan Location
Leetermairremener	St Patricks Head
Linetemairrener	North Moulting Lagoon
Loontitetermairreleho-inner	North Oyster Bay
Toorernomairremener	Schouten Island
Poredareme	Little Swanport
Laremairremener	Grindstone Bay
Tyredededeme	Maria Island
Portmairremener	Prosser River
Pydairrerme	Forestier and Tasman Pensinsula
Moonmairrremener	Pitt Water, Risdon

Table 1: Clans of the Paredarerme Nation (Ryan 2012)

More than 1000 Aboriginal heritage sites have been recorded within the Glamorgan-Spring Bay Council (GSBC) municipality. Most of the recorded sites are situated along the coast and are comprised of shell middens. With many known Aboriginal Heritage sites located by rivers and on the coast, events associated with climate change, such as flooding, coastal recession and inundation, put these sites at risk.

Other types of recorded Aboriginal heritage include stone quarries, stone artefacts and rock shelters. Many of the Aboriginal heritage sites were recorded in the 1980s and 1990s and therefore the information is often minimal. Consequently, the nature and extent of the recorded Aboriginal heritage sites is not fully known. There are also large swathes of the municipality that have had no formal Aboriginal heritage assessment and therefore the Aboriginal heritage values of these areas are largely unknown. These 'gaps' in recorded data are substantial, particularly within inland areas. A small number of sites recorded more recently have a higher level of detail.[11]

In 2019 a parcel of private land in the Little Swanport Catchment was returned to the Tasmanian Aboriginal Community. This land is now owned and cared for by the Aboriginal community.

The richness of natural resources within the Glamorgan Spring Bay area supported the local clans of the Paredarerme Nation, whose traditional land management practices have in turn influenced and shaped the landscape we see today.

While the concept of cultural landscapes is well recognised, there has been very little assessment and identification of cultural landscapes within Tasmania to date. Engagement and consultation with Tasmanian Aboriginal people will be important to understand the broader values and/or landscapes of significance to the Aboriginal community.[12]

There is an opportunity to work with the Aboriginal community to raise awareness of the rich Aboriginal history of this area, to promote initiatives that help our understanding of the cultural landscapes and support local Aboriginal people to care for Country and to preserve traditional bush food knowledge and practice. Learning more about traditional land management techniques can help us understand, maintain and improve the management of our natural areas.

11 Personal communication AHT 2023
12 Personal communication AHT 2023

Managing our cultural landscapes

1. CULTURAL LANDSCAPES				
OBJECTIVE : Understand and maintain the diversity of Glamorgan Spring Bay's cultural landscapes				
Goal	**Action**	**Measure of success**	**Priority**	**Time-frame**
1.1 Understand and support the diversity of Aboriginal culture	1.1.1 Identify key people and/or groups to work with to improve understanding of Aboriginal community aspirations	1.1.1.1 Key people and/or groups are involved in NRM discussions by 2024	H	S
	1.1.2 Improve understanding of the cultural landscapes in Glamorgan Spring Bay	1.1.2.1 Priorities for local Aboriginal community are documented and incorporated in existing plans and strategies	H	M
	1.1.3 Incorporate Aboriginal names for significant places/areas	1.1.3.1 Aboriginal names in place at a minimum of two (2) locations by 2028	M	M
	1.1.4 Promote Aboriginal history and the diversity of Aboriginal culture through interpretive signage and cultural activities as appropriate	1.1.4.1 Cultural activities incorporated into two (2) community NRM events annually	M	M
	1.1.5 Seek funding and support for activities that assist to preserve traditional bush food knowledge and practice	1.1.5.1 Funding secured and one (1) activity each year. First Activity by 2025.	H	M
	1.1.6 Facilitate Aboriginal Heritage Awareness training for council staff and community volunteers	1.1.6.1 At least 80% of relevant council staff have undertaken training by 2028	M	S
		1.1.6.2 One cultural awareness session for community members by 2026		

Table 2 Action table for managing cultural landscapes -
Priority H- High, M-Medium, L-Low.
Timeframes: S - Short 1-2 years; M- Medium 3-5; L – Long 5+ years

1. CULTURAL LANDSCAPES (Continued)				
Goal	**Action**	**Measure of success**	**Priority**	**Time-frame**
1.2 Increase Aboriginal participation in land management	1.2.1 Advocate for an Aboriginal Ranger program	1.2.1.1 Potential funding sources have been identified and the community have been supported to access funding by 2027	H	M
	1.2.2 Promote Aboriginal participation in land management	1.2.2.1 At least one (1) Aboriginal identified position on land management teams working in GSB by 2027	H	S
	1.2.3 Investigate training and pathways for Aboriginal participation in land management and conservation	1.2.31 Discussions with employment agencies and training providers - two (2) Aboriginal people have gained work experience with a land management crew by 2025	H	S
	1.2.4 Work with Firesticks and/or other indigenous fire programs to undertake cultural burning activities to manage natural values and the cultural landscape	1.2.4.1 Identify priority sites and support the development of a cultural burning plan for these sites – undertake at least two (2) cultural burns by 2028	M	M
	1.2.5 Work with Aboriginal organisations to build local capacity to participate in cultural fire management programs to manage natural values	1.2.5.1 Support the involvement of at least five (5) people in cultural burning practices	M	M
1.3 Improve understanding and protection of cultural heritage sites	1.3.1 Seek funding to undertake Aboriginal Heritage assessments in priority areas	1.3.1.1 Aboriginal Heritage assessments completed for priority areas	H	M
	1.3.2 Support the investigation into the concept of a sensitivity zoning system to prove a practical guide for the management of Aboriginal Heritage.	1.3.1.1 Recommendations of the Aboriginal Heritage assessments implemented	L	L
		1.3.2.1 GSBC is involved in discussions with other organisations regarding sensitivity zoning		

Photo - Robyn Moore

Water

Water is fundamental to all life. We drink it. We wash with it. We need it to grow food. Water keeps our communities and ecosystems healthy and supports our towns and our economy. It is a critical natural resource.

Water includes freshwater, estuarine and marine environments which are all interconnected.

The **water cycle** is key to a healthy environment and economy, which both rely on surface and groundwater. When rain falls it soaks the land. The water that flows across the surface as surface water collects in wetlands, dams, creeks and rivers. Water that seeps down into the soil can be stored in the soil and rock crevices as groundwater.

Healthy soil and vegetation can help capture water. The plants take up water and then transpire, giving off moisture. This combines with moisture evaporating from the ground, rivers, creeks and dams, and from our seas and oceans. Tiny water droplets condense and form clouds. The clouds release rain, and the water cycle starts again.

In low rainfall areas such as the east coast, additional water is needed for agriculture – to water livestock and to grow grapes and fruit. Surface water is collected in dams and groundwater is extracted through bores. Water is also taken from streams for irrigation, and for stock and domestic supply. Increasing demand and a trend toward longer dry spells can lead to additional pressure on some groundwater resources and overland flows.

Water quality will be affected if too much water is taken out of the water system. It is also affected by run-off from urban, industrial, agricultural and aquaculture activities. Sediments entering water ways not only cause siltation but also carry nutrients and bacteria into the water. Weed infestations can also influence water quality.

Rehabilitating riparian, estuarine and coastal areas, maintaining ground cover, and planting trees and shelterbelts can help retain moisture and improve water quality.

For healthy ecosystems, human health and a sustainable primary production industry, it is important to monitor and manage our water systems to ensure critical flows and good water quality.

A water catchment includes the areas of the landscape where water collects when it rains, and through which water flows as it makes its way to a lake or ocean. Catchments include freshwater, estuarine and marine environments. Freshwater quality and quantity affects the marine environment and vice versa. For instance, additional nutrients and silt flushed out of a river system during a flood event can affect sea grass beds in the marine environment. Storm events can move sand and debris, altering the shape and flow of river mouths. High tides can result in saltwater inundation especially when combined with a storm event.

There are three major catchments in Glamorgan Spring Bay which arise in the hills to the west and flow over the landscape to the coast in the east. Figures 5 & 6 show the catchments, waterways and high value estuaries, wetlands and saltmarshes in GSB.

The Prosser catchment at the southern end of the municipality includes a land area of approximately 104,000 hectares including Maria Island. It is made up of a number of river and creek systems. The Prosser River arises in forest production land in Southern Midlands, flowing through freehold land to the coast at Orford. The Sandspit River arises in the Wielangta Forest, winds its way through the Sandspit River Conservation Area, then through private freehold land to Earlham Lagoon at Rheban. MacLaines Creek begins in the Bluestone Tier and then flows through MacLaines Creek Conservation Area before reaching the coast at Triabunna. Eighty Acre Creek joins Ashgrove and Wattle Paddock Creeks, crossing private land before it reaches the coast at Grindstone Bay.

Photo – Robyn Moore

The Little Swanport Catchment is approximately 87,600 ha. The upper catchment area is located in the Southern Midlands Municipality where a plateau interposed with hills and is largely used for dryland grazing. From there numerous tributaries join the Little Swanport River as it makes its way through the eastern tiers down to relatively flat agricultural land where it is joined by Ravensdale Rivulet. This estuarine river mouth is popular for recreational fishers and supports several oyster farm operations before reaching the marine environment.

At the northern end of GSB the Swan Apsley Catchment is defined by the watersheds of the Swan, Apsley, Meredith and Stoney Rivers as well as number of creeks and numerous coastal streams. It covers approximately 138 000 hectares and includes the wetlands of Apsley marshes and Moulting Lagoon, the Great Swanport estuary and Great Oyster Bay. Forestry operations occur in some parts of the upper catchment which is largely native forest while primary production occurs in the foothill and floodplains.

In 2020, a state-wide assessment of river health in Tasmania[13] found that in most catchments, the upper reaches of rivers are generally healthy and in a stable condition, while the mid to low reaches tend to be degraded or experiencing declines in condition. The report found that poor health was generally attributed to agricultural land use (particularly grazing), salinity and water capture and extraction. It also indicated that conservation land use was associated with healthy river condition. The report emphasised the importance of having a whole of landscape approach to river health.

According to the 2020 report[14], testing for water health (using macroinvertebrates and basic water quality measures as criteria), was undertaken at single points in each GSB catchment and compared with the condition of reference sites in pristine or minimally disturbed catchments. The river health of the Little Swanport and Prosser Rivers rated as significantly impaired whilst the Swan River was in "reference condition" with relatively high biodiversity.

13 DPIWE 2020
14 DPIWE 2020

The water of Little Swanport. Photo – Hayden Dyke

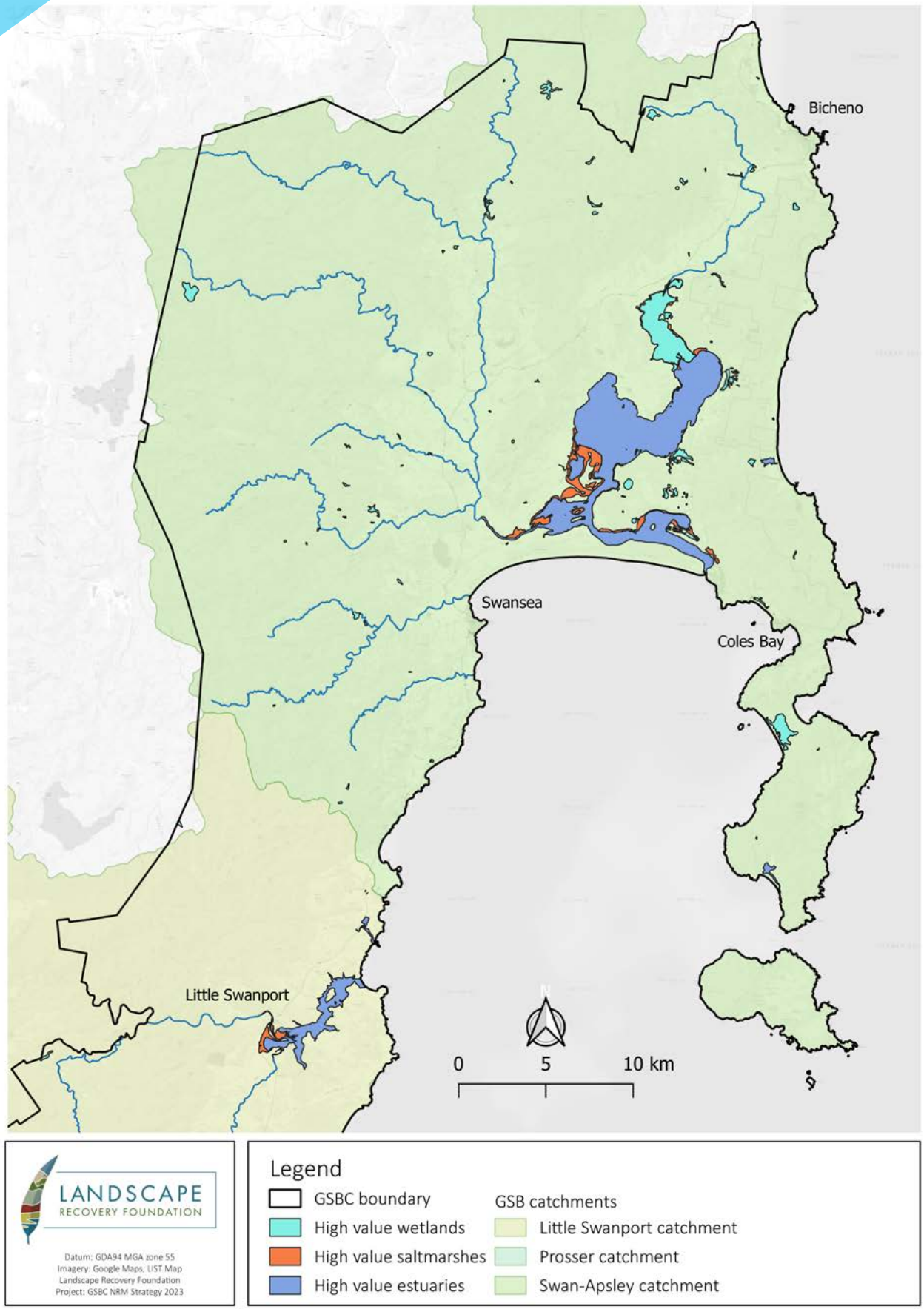


Figure 5 – Northern area of Glamorgan Spring Bay LGA showing the three catchments, major watercourses, and high value estuaries and wetlands and saltmarshes

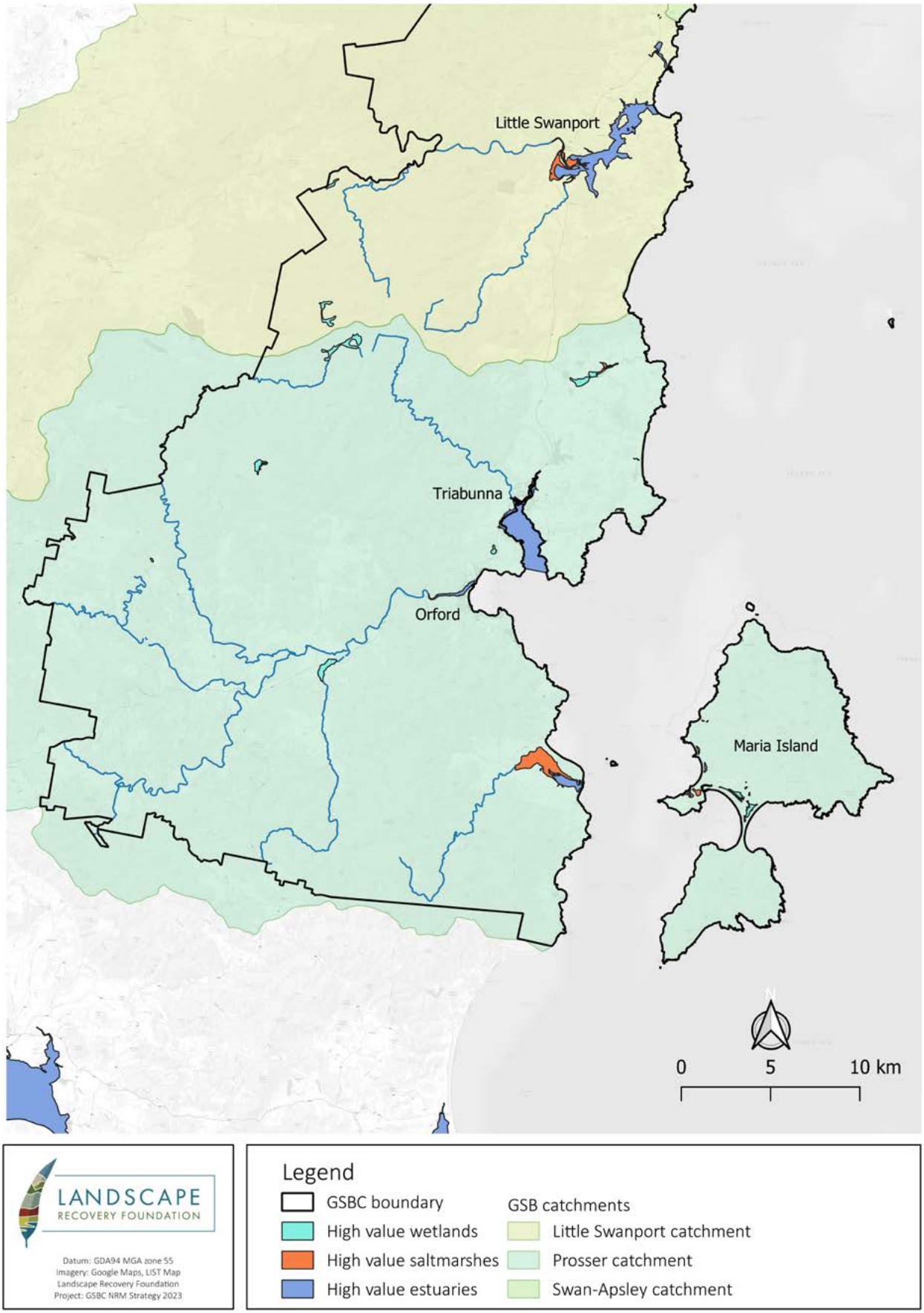
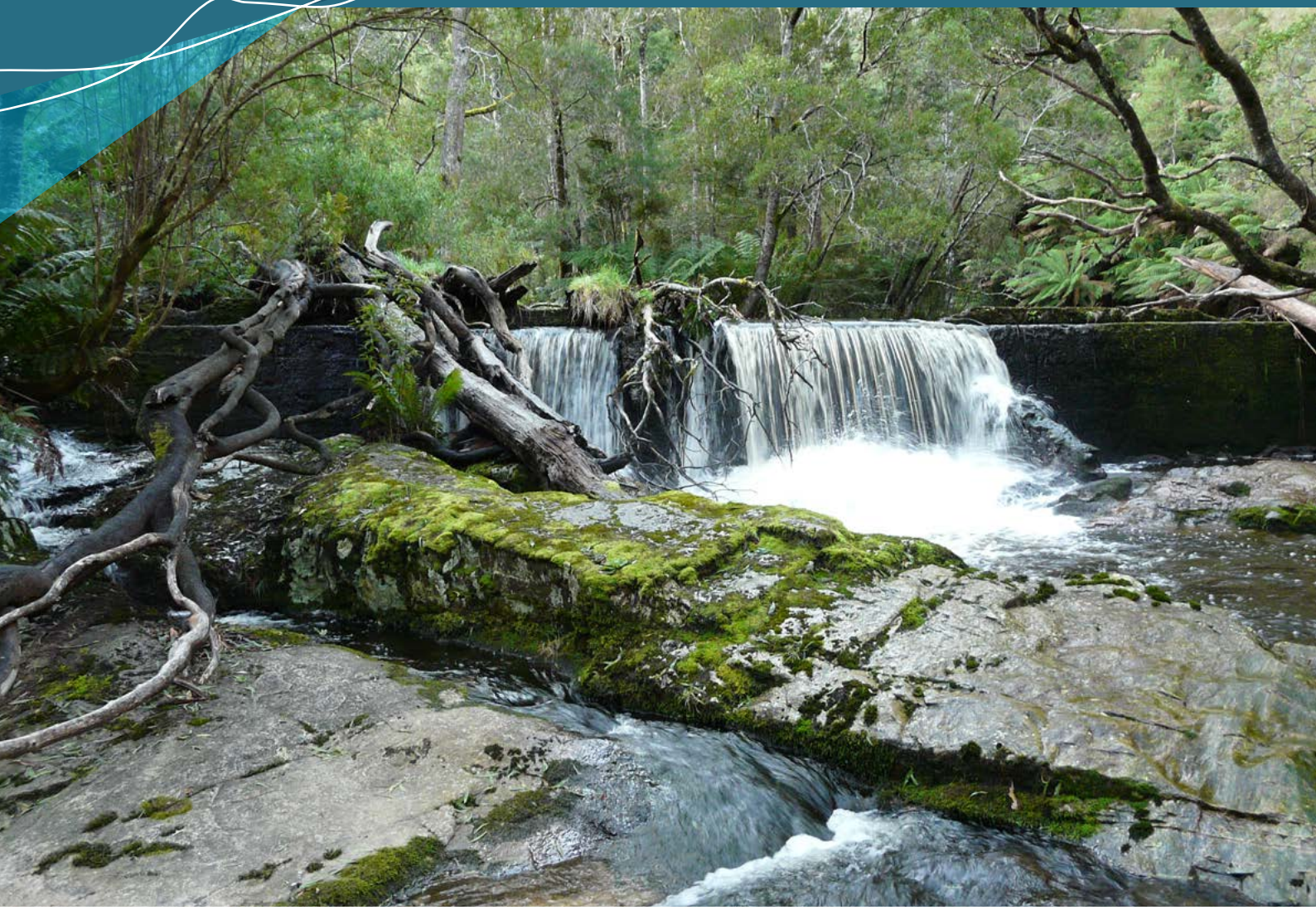


Figure 6 Southern area of Glamorgan Spring Bay LGA showing the three catchments, major watercourses, and high value estuaries and wetlands and saltma



Halls Falls. Photo - Alan Morgan

Water Use & Quality

The townships of Orford, Triabunna, Swansea, Coles Bay and Bicheno have town water supplies managed by Taswater.

Orford is supplied from the weir on the Prosser River, Triabunna by both MacLaines and Bradys Creeks. Swansea is supplied from a holding dam west of the township, filled from weirs on the Meredith and Swan Rivers. Bicheno is supplied from the Apsley River. Coles Bay is supplied by the Northern Tin Mines Dam (previously called the Middletong Creek intake) and the Coles Bay Supply Dam (previously called the Saltwater Creek intake).

Some properties store and use water from dams located within the catchments. Other properties utilise groundwater boreholes, particularly along Dolphin Sands. Several properties in the Swan Aspley are part of the Swan Valley irrigation system which includes the Melrose Lake Dam. The upper part of the Little Swanport catchment is in the Southern Midlands municipality and services land holders in that area. There are a number of dams in the upper reaches of Little Swanport river.

As water is a vital resource, equity of water access is essential. Many landholders hold water licences, however not all licences are in use. At times of low flows, adjustment to water takes is important to ensure environmental flows are maintained and help protect aquatic biodiversity and water quality

downstream. As the demand for water increases, measuring, monitoring and compliance around water allocations will be essential.

Adequate treatment of sewage and wastewater is important to maintain the health of our waterways and coastal ecosystems. The townships of Orford, Triabunna, Swansea and Bicheno are serviced by sewerage networks with treatment plants managed by Taswater. However, some of this infrastructure is aging and will need to be upgraded to meet current and future demands, particularly when the populations swell during holiday periods. In other less populated areas, the maintenance of septics and other wastewater disposal systems is important to avoid spills and seepage that can contaminate rivers, creeks and beaches. Leaking pipes and septics combined with stormwater runoff can lead to serious water contamination.

Taswater monitors drinking water supplies. River water flows are also monitored at key sites across the municipality. The Department of Natural Resources and Environment undertake river health monitoring and is currently reviewing this process.

Estuaries

As the rivers and creeks get closer to the coast they become influenced by the freshwater and sediments from upstream and tidal influxes and saltwater from downstream. The mixing of these waters creates water that is rich in nutrients. Estuarine environments are amongst the most productive in the world, producing more organic matter than equivalent forest, grassland or agricultural areas.[15]

Estuaries provide important habitat for many birds, fish and invertebrates particularly when species are breeding or spawning[16], and play an important role for many commercial fish species at some point in their life cycle[17]. The estuaries of GSB were no doubt well utilised by clans of the Oyster Bay Nation as good sources of food and water.

Riparian and wetland areas adjacent to our waterways, estuaries and coastal areas provide important environmental services, acting as filter systems to help maintain water quality. They support biodiversity including an array of plants specifically adapted to life in these conditions such as those found in saltmarshes communities, as well as migratory birds, water birds and fish. Glamorgan Spring Bay is home to a number of important wetland sites including Ramsar sites of international significance at Moulting Lagoon and the Aspley Marshes.

Many townships in Tasmania, including the main centres of Glamorgan Spring Bay, Orford, Triabunna, Swansea and Bicheno are based near rivers and estuaries. In early days of colonisation, they would have provided a good source of food and access to water for transportation. Today they provide recreational and fishing opportunities that are an integral part of our lifestyle. These estuaries and their catchments support our economy and our health and wellbeing. However, human activities and intervention around Tasmania's estuaries have resulted in loss of habitat, increases in siltation and a decline in water quality.[18]

Spring Bay, Little Swanport, Earlham Lagoon and Moulting Lagoon have been identified as submerged or intertidal areas with potential to contain acid sulphate soils. If disturbed or exposed these soils can seriously affect water quality.

Edgar et al (1999) looked at the conservation significance of Tasmanian estuaries considering ecological and physical characteristics, as well as human influences of population and land use. Table 3 shows the significance of estuaries within Glamorgan Spring Bay. Bryans Lagoon on the Freycinet Peninsula was the only estuary considered to be of critical conservation significance. In 1999 no estuaries in GSB were considered severely degraded.

15 RPDC 2006 in Pollino 2010
16 Pollin 2010
17 RPDC 2006 in Pollino 2010
18 DPIW 2009 in Polino 2010

Conservation Significance		Recommendation	Estuary
	CRITICAL - Minimal human activity and exceptional fish and invertebrate biodiversity	Full protection	Bryans Lagoon
	HIGH - Relatively pristine or contain an unusual range of species	Quarantine from future development, reduce existing human impacts – hook and line fishing only & existing marine farm leases only (1999)	Freshwater Lagoon
			Great Swanport
	MODERATE - Affected by human habitation and land clearance but not badly degraded	Available for recreation and commercial purposes	Saltwater Lagoon
			Stony
			Buxton
			Lisdillon
			Little Swanport
			Grindstone
			Earlham Lagoon
	LOW - Moderately degraded by human impacts	Available for recreation and commercial purposes – remediation where practical	Denison
			Meredith
			Spring Bay
			Prosser
	LOW - Severely degraded by human impacts	Available for recreation and commercial purposes – except where public health risks	-

Table 3: Conservation significance of estuaries in GSB adapted from Edgar et al (1999)

Establishing baseline data and measures of environmental health will be important to guide the management of these areas to ensure that the condition of our estuaries is maintained or improved. Maintaining good water quality in our estuaries is also important for commercial enterprises such as oyster farming.

Preventing introduction and minimising spread of marine pests diseases are critical for the health of our estuaries.

Glamorgan Spring Bay has a diverse coastal line. Photo - GSBC

Coastal & Marine

With its islands, sea cliffs, headlands, bays and inlets, coastal lagoons and long sandy beaches, the Glamorgan Spring Bay coast is diverse. This diversity reflects both the different underlying geology, and the influence of a range high to low energy environments. The coast supports a range of habitats including rocky reefs, foreshore flats and soft bottom habitats such as sea meadows or sea grass beds.

Healthy seagrass habitats support a high diversity of fauna, however many have been lost, fragmented and damaged by poor catchment management, through practices such as sewage and stormwater discharges, urban runoff, dredging, boating and land reclamation.[19]

Other environments include shallow exposed rocky reefs and as well as more sheltered reefs in lower swells. A change in reef communities has been observed with an increase in eastern Australian species at the expense of some Tasmanian species. Our waters support a wide variety of marine invertebrates and fish. Many of which are important commercial resources for our fishing and marine farming industries. There are two marine reserves in GSB, at Governor Island and Maria Island, protecting marine habitat and providing snorkelling opportunities.

The Glamorgan Spring Bay population is largely concentrated on the coast. With many people living, working and/or recreating on the coast, these areas come under intense pressure.

19 DNRE

GSBC undertakes recreational water sampling at Muirs & Richardsons Beaches in Coles Bay, Waubs Beach in Bicheno, Jubliee Beach in Swansea, Raspins, East Shelly and Spring Beach at Orford.

Climate change and sea-level rise will have significant impacts on our coastline. Shorelines are predicted to retreat due to impacts from: storm surge and flooding; erosion and recession of open sandy coasts; slumping and collapse of shorelines and sea cliffs.[20]

The greatest ocean warming in the Australian region since 1970, has occurred off south-east Australia and Tasmania. With the East Australian Current (EAC) extending further south, there has been rapid warming in areas of the Tasman Sea, estimated to be twice the global average warming rate. This warming has contributed to an increase in the length and frequency of "marine heat waves". These events impact marine ecosystem health, habitats and species.[21]

The cooler waters of south-eastern Tasmania support high levels of localised endemic macroalgae and some of the largest species in Australia. Marine species and communities, such as the endangered giant kelp forests, are in decline on the east coast due to the movement of the EAC southward.

The increase in acidification of the oceans around Australia as a result of carbon dioxide in the atmosphere is an additional pressure. Impacts on marine ecosystems include changes in reproduction, organism growth and physiology, species composition and distributions, food web structure, nutrient availability, and reduced calcification rate.[22]

Modelling of the impacts of climate change within Tasmania's marine shelf environment indicated that while some fisheries would benefit from increased primary production, others were likely to be negatively affected.[23]

Threats of climate change and introduced marine pests have the potential to cause substantial loss of biodiversity within estuaries and marine environments.

Marine debris has long been identified as a risk to our marine environment with larger plastics such as ghost nets and plastic bags impacting sea birds, turtles, fish, whales and dolphins.

Small plastic particles are now being found in the gut contents of marine species, with even smaller particles persisting in the bodies of animals[24] and people[25]. The small size of these microplastics mean they can be consumed by a wide range of marine species including plankton, shellfish, birds and fish, with the potential to contaminate the whole food chain. Microplastics have been shown to inhibit growth and development in some fish, have toxic effects that affect reproduction and impair the genetic function of marine life. Microplastics can also have harmful effects on zooplankton at the foundation of the food chain.[26]

In 2017, a study of marine sediments across south-eastern Australia found microplastics were well distributed in marine sediments at all sites including remote areas away from urban centres. Bicheno had the highest concentration of microplastics recorded during the study. The study showed that microplastics now occur in high concentrations in seafloor sediments in all coastal and estuarine environments,[27] indicating that are not only present in the water itself but some types are accumulating on the sea floor.

The negative impacts of plastics on the marine environment pose a real risk to marine health and its ability to cope with the additional pressures of climate change.

20 Sharples 2006
21 CSIRO
22 CSIRO
23 Watson et al 2013
24 Smith, M. et al 2018
25 Blackburn & Green 2022
26 Li, Y et al 2006
27 Ling, S et al 2017

In 2003, Coles Bay became a world leader in the fight against plastic pollution by gaining agreement of all local businesses to cease using plastic shopping bags, adopting canvas bags instead, and adopting corn starch "plastic" bags for perishable foods.

GSB has the potential to build on this to become a world leader by banning single-use plastics across the municipality, working with producers, retailers and consumers to reduce plastic use and waste and continuing to work together to clean up waterways and beaches.

High concentrations of microplastics were found in marine sediments off Bicheno. Photo - James Cook University

A healthy marine environment combined with good fishing practices can support a sustainable fishing industry. Inappropriate harvesting practices that result in by catch, habitat damage and introduction of marine pests and diseases can have negative impacts. By changing the population size of one species within the food chain, fishing can impact the populations of other species within the food chain. For instance, the removal of large rock lobsters can allow sea urchins to invade and damage new areas.[28]

Good fishing practices can support a sustainable fishing industry. Photo - GSBC

Protecting a section of a river, a wetland, an estuary or the coast requires protection of the processes that sustain that system. For instance, an area being impacted may be located some distance from the key threats, which may originate further upstream, from saltwater inundation downstream, or from storm surges off the coast. The impacts of sea level rise on ground water systems are not fully understood. Clearly, management of our water systems requires an integrated landscape approach.

A complex array of laws and planning instruments including International, Commonwealth and State legislation aim to govern the sustainable management of our water resources. With the number of authorities involved, the differing land tenures that adjoin and manage water bodies, combined with the dynamic nature of our rivers, estuaries and coast, it is not surprising that their management is complex.

28 GSBNRMC 2013

Photo – GSBC

Threats to sustainable water resources:

- **Climate change** - water temperature changes, acidification, changes to freshwater and estuarine flows and marine currents, inundation, erosion, introduction of new weeds pests and disease will magnify existing threats to our water systems.
- **Erosion**- Removal of vegetation on or near foreshores and watercourses can result in erosion and increase risks of flood and inundation. It is important to retain riparian, wetland and coastal vegetation to stabilise rivers, streams and estuarine and coastal environments.
- **Extraction of surface and ground water** – Balancing the needs of the environment and water users is critical. To sustain healthy ecosystems in Glamorgan Spring Bay's waterways, environmental flows need to be maintained, particularly in times of low water flow. Reduced flows lead to reduced water quality as pollutants become more concentrated and wetland and riparian functionality is impeded. Water taken up stream can have detrimental effects in estuarine areas downstream. Water flows and extraction are managed by the State Government. However, advocating for the sustainable use of water resources is an important part of this strategy.

- **Modification of water flow and drainage** – dams and weirs alter water flows and can prevent the movement of aquatic plants and animals within the waterway. In-stream dams and barriers should be designed to facilitate natural migration. Fish ladders can also be installed on existing structures. Altering natural drainage and vegetation cover changes the hydrology (water movement and make up) affecting ecosystem function particularly in wetland and riparian areas
- **Overharvesting and other direct impacts on biota**. This can be the result of pressure from recreational and commercial fishers, inappropriate harvesting methods such as netting, inappropriate catch levels, and barriers that impede natural movement of animals and plants
- **Plastics** entering into our water systems can disrupt natural processes, with microplastics concentrating up the food chain and posing a long term risk to marine life and human health. Plastics are circulating throughout the marine environment and a worldwide collaborative effort is needed. GSB has the opportunity to be a leader in reducing plastic pollution.
- **Point source pollution** - such as effluent from leaking septics and aging sewer systems industrial and agricultural waste discharge, spillage and waste from boats. The maintenance of septics and sewer systems and the responsible disposal of waste all help improve water quality.
- **Runoff** – pollutants and suspended matter entering the waterways can reduce water quality. Often it is difficult to identify the source of this diffuse pollution. Retaining vegetation cover can minimize run-off and reduce siltation. Management and restoration of riparian areas, wetlands and saltmarshes which act as filtration systems are also key to improving water quality. Management of stormwater, installation of gross pollutant traps and litter baskets and use of water sensitive urban design can also help reduce impacts on water quality. Impacts can also be reduced by implementing erosion and sediment controls for developments and minimizing disturbance in areas prone to erosion such as areas with dispersive soils.
- **Stock access to waterways** – stock graze and trample vegetation, disturb soil and riverbanks as well as fouling the water. Fencing off riparian areas and installing alternative off stream watering points can reduce these impacts.
- **Vehicles and trampling** damage plants and habitat, open areas to erosion, and can alter water flows particularly in wetland and coastal areas
- **Weeds, pests and diseases** – Willows along rivers and streams can disrupt flows and reduce the oxygen levels available for other plants and animals. Other weeds displace native vegetation, reducing the effectiveness of ecosystem function and resilience. Aquatic pests and diseases have the potential to destroy marine and freshwater environments and to decimate recreational and commercial fisheries and other aquatic industries. Boating, fishing and diving gear can carry introduced species. It is important to clean and dry equipment when moving from one area to another

Managing our water

2. WATER				
OBJECTIVE : To improve or maintain the condition of freshwater, estuarine and coastal ecosystems				
Goal	**Action**	**Measures of success**	**Priority**	**Time-frame**
2.1 Water use is equitable and its use is measured, transparent and accountable	2.1.1 Advocate for a reliable and equitable water supply for drinking water, irrigation, recreation and environmental flows	2.1.1.1 - A written advocacy position piece has been prepared and is submitted to relevant government initiatives by 2024	H	S
	2.1.2 Take an active advocacy role in the implementation of the Rural Water Use Strategy's "Water Accountability, Metering and Reporting" project to ensure water takes are being accurately monitored and the information is used to inform decision-making in GSB	2.1.2.1 - Revised water accountability, metering and reporting framework is in place by 2028	H	M
		2.1.2.2 - Major water users have water meters in place and data is being collected and collated by 2030		
	2.1.3 Take an active advocacy role in the implementation of the Rural Water Use Strategy's "Water Information Management System Upgrade" project to ensure greater accountability and transparency around water use to improve water management in GSB	2.1.3.1 - Upgraded Water Information Management System which includes information on water use and water quality is in place and visible to all stakeholders by 2028	H	M
2.2 Environmental flows and the condition of our water systems are understood and monitored	2.2.1 Advocate for environmental flows that sustain healthy ecosystems in all waterways	2.2.1.1 - Develop a representation to State Government regarding environmental flow concerns by 2024	M	M
		2.2.1.2 - Develop & distribute a short video to promote awareness around environmental flows 2024		
	2.2.2 Take an active role in the implementation of the Baseline Water Quality Monitoring Program to ensure it incorporates aquatic health indicators in GSB	2.2.2.1 - Investigate opportunities to work with the oyster industry to utilise water monitoring stations by 2024	L	M
		2.2.2.2 - Monitoring program in place by 2025		

Table 4 Action Table for managing water resources

Priority H- High, M-Medium, L-Low.

Timeframes: S - Short 1-2 years; M- Medium 3-5; L – Long 5+ years

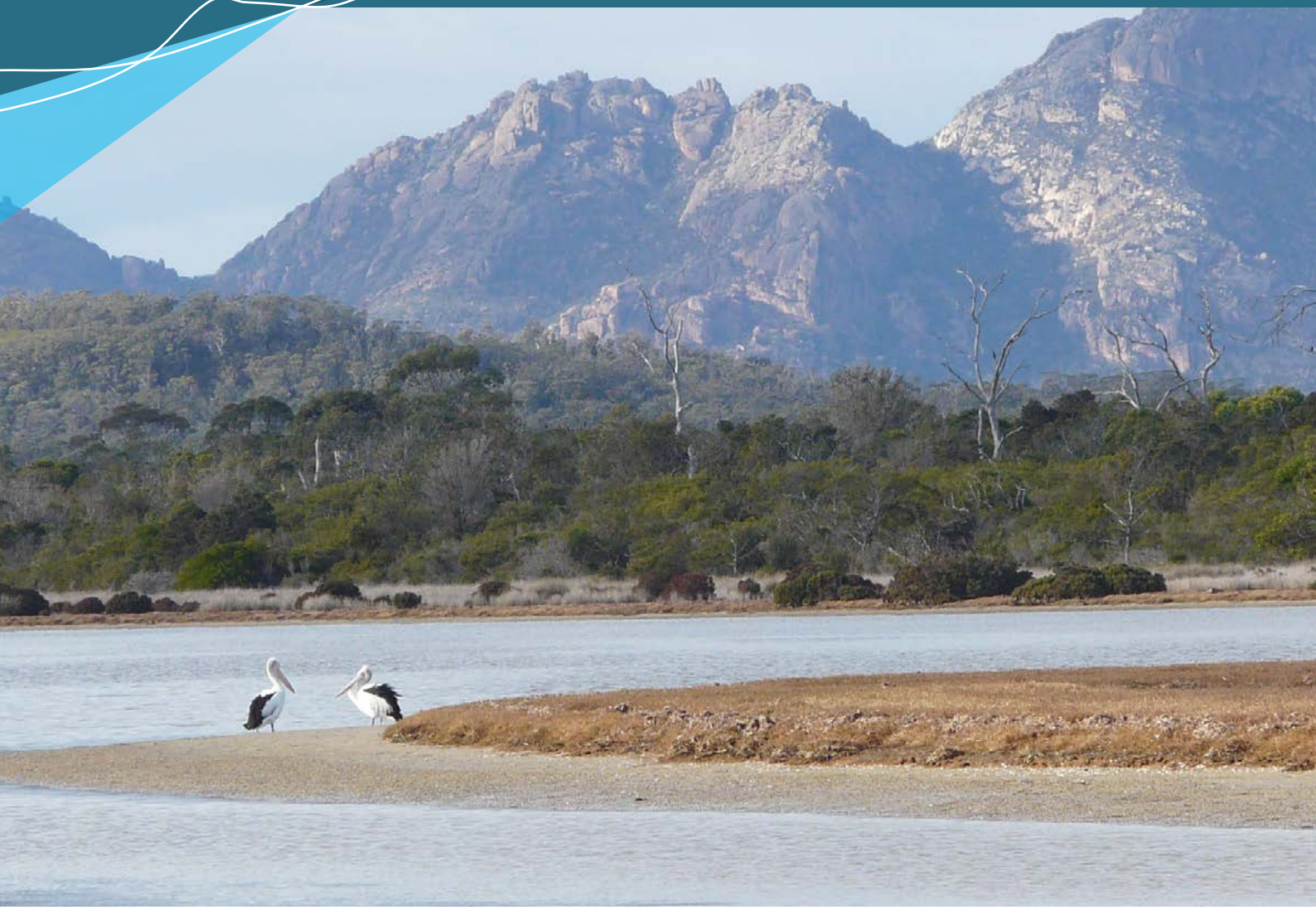
2. WATER (Continued)				
OBJECTIVE : To improve or maintain the condition of freshwater, estuarine and coastal ecosystems				
Goal	**Action**	**Measures of success**	**Priority**	**Time-frame**
	2.2.3 Undertake condition assessments of riparian and wetland habitats in strategic locations within Glamorgan Spring Bay	2.2.3.1 - Baseline data is collected and hot spots identified for major rivers/ tributaries and collated by 2025	M	M
	2.2.4 Monitor natural values at key sites such as marine reserves	2.2.4.1 - Key sites identified by 2024 2.2.4.2 - Monitoring program developed by 2026 2.2.4.3 - Condition data is available to inform management by 2028	L	M
2.3 Freshwater, estuarine and marine water systems are restored or improved	2.3.1 Identify and prioritise riparian, wetland and coastal areas for restoration	2.3.1.1 - Actions in catchment action plans reviewed and prioritised for restoration by 2024	H	S
		2.3.1.2 - Previous restoration projects evaluated and key actions for follow up prioritised by 2024		
	2.3.2 Restore and improve priority riparian, wetland and coastal areas	2.3.2.1 - Priority restoration activities have commenced by 2025 and 30% of priorities are implemented by 2027	H	S
		2.3.2.2 -10% increase in riparian vegetation condition by 2028		
	2.3.3 Advocate for additional or extended marine reserves and no-take zones in all existing marine reserve areas to ensure the protection of a diversity of physical conditions, habitats and biotic communities	2.3.3.1 - No-take zones in place in existing marine reserve areas by 2028	L	L
	2.3.4 Investigate and pursue opportunities for restoration and rehabilitation of marine values	2.3.4.1 - Resources secured for restoration and rehabilitation works informed by condition data (2.2.4.3)	M	L
	2.3.5 Seek partnership opportunities with marine and freshwater focused organisations	2.3.5.1 - MOU in place with at least two other organisations by 2026	H	S

2. WATER (Continued)				
OBJECTIVE : To improve or maintain the condition of freshwater, estuarine and coastal ecosystems				
Goal	**Action**	**Measures of success**	**Priority**	**Time-frame**
2.4 Impacts on our water ecosystems are reduced	2.4.1 Support practices that reduce erosion and pollution of waterways	2.4.1.1 - Increase in riparian areas fenced off and managed	M	M
		2.4.1.2 -Off-stream watering points installed at identified hotspots		
		2.4.1.3 - Erosion and sediment control compliance is maintained in development settings by 2025		
		2.4.1.4 - Oil spill kits are installed and maintained at key locations		
	2.4.2 Ensure erosion control works are appropriate, planned and implemented according to best practice	2.4.2.1 - Erosion control works comply with best practice	H	M
	2.4.3 Use water sensitive urban design to minimise impacts of runoff in urban areas	2.4.3.1 - WSUD is incorporated into new developments	L	M
	2.4.4 Manage the spread of riparian wetland and coastal weeds by implementing strategic cooperative weed control	2.4.4.1- Glamorgan Spring Bay weed management program in wetland and foreshore areas is implemented annually	H	M
		2.4.4.2 - Ongoing support for a weed management officer is maintained		
		2.4.4.3 - Ongoing participation in cross municipal weed collaboration		
	2.4.5 Follow up on previous weed control projects	2.4.5.1 - Annual follow up of weed control projects is prioritised before embarking on new projects	M	M

2. WATER (Continued)				
OBJECTIVE : To improve or maintain the condition of freshwater, estuarine and coastal ecosystems				
Goal	**Action**	**Measures of success**	**Priority**	**Time-frame**
	2.4.6 Promote awareness of biosecurity risks, early identification how to prevent establishment and spread amongst community, industry and recreation groups	2.4.6.1 - Develop a video specific for GSB and biosecurity for residents and visitors by 2025	H	S
		2.4.6.2 - Biosecurity video is promoted through East Coast Tourism Board by 2025		
		2.4.6.3 - Video is updated annually to include emerging risks		
	2.4.7 Work with key stakeholders to identify and implement solutions to mitigate/rehabilitate negative impacts of marine pests at key sites	2.4.7.1 - Solutions identified for key sites	M	M
		2.4.7.2 - Solutions implemented at 1 key site		
	2.4.8 Develop a periodisation plan for fish ladders at key sites and implement priority actions	2.4.8.1 - Plan completed by 2025	L	L
		2.4.8.2 - At least 1 priority fish ladder in place by 2028		
	2.4.9 Advocate for sustainable recreational and commercial fishing that considers potential climate changes impacts on marine ecosystems	2.4.9.1 - One advocacy piece by 2025	M	S
	2.4.10 Identify illegal access in coastal, riparian and wetland and rehabilitate the areas to mitigate impacts of wind and water erosion	2.4.10.1 - Identify illegal access points - how many and where by 2025	H	M
		2.4.10.2 - Increase in vegetation cover at priority disturbed access points by 2028		

2. WATER (Continued)				
OBJECTIVE : To improve or maintain the condition of freshwater, estuarine and coastal ecosystems				
Goal		**Measures of success**	**Priority**	**Time-frame**
2.5 Rubbish in riparian wetland, coastal and marine areas is reduced	2.5.1 Four (4) community clean-ups a year	2.5.1.1 - 60% reduction in rubbish observed at foreshore Clean up Australia activities (measured against the amount collected as part of the clean-up) by 2027	H	S
	2.5.2 Assess need for litter traps in key locations	2.5.2.1 Key locations identified	H	S
	2.5.3 One (1) demountable litter trap installed each year	2.5.3.1 - New litter traps are maintained regularly and cleaned after major weather events	M	M
	2.5.4 Work with key stakeholder groups to reduce marine debris	2.5.4.1 - Single use plastic bags and containers are banned and phased out	H	M
	2.5.5 Advocate for and support campaigns to reduce waste and promote responsible recycling and composting of green waste	2.5.5.1 - 5 % reduction in general waste each year	H	M
2.6 Facilitate improved understanding of freshwater, estuarine and marine ecosystems	2.6.1 Facilitate activities that improve understanding and management of riparian, wetland and coastal vegetation	2.6.1.1 - Education program around the importance of riparian vegetation health for water quality by 2025	H	S
		2.6.1.2 - Increase in adoption of sustainable practices by 2027		
	2.6.2 Encourage community to use citizen science apps such as Redmap to report marine pests	2.6.2.1 - Increase in records on Redmap or similar apps annually	L	M
	2.6.3 Promote the importance of maintaining septic systems	2.6.3.1 - Septic awareness article/post annually	H	S

Evening, Coles Bay. Photo - Alan Morgan



Granite outcrops. Photo - Alan Morgan

Land

Sustainable land management is about using our land resources to meet changing human needs whilst ensuring the long-term productive potential and ecosystem functions of the land. Selecting the appropriate land uses and management regimes to suit the land capability and climate, minimising land degradation and rehabilitating degraded areas are essential for sustainable production.

The land formations and topography of Glamorgan Spring Bay are a result of the underlying geology of the area. The more well-known formations to the east such as the Hazards and Schouten Island are Devonian granite. This relatively hard rock is exposed as the striking outcrops and boulders seen at Bicheno, the Freycinet Peninsula and on the eastern side of Maria Island.

The most widespread rock type in Glamorgan Spring Bay is Jurassic dolerite. The Eastern Tiers form a continuous range of dolerite hills to the west of the municipality. Permian and Triassic sediments and other rock types are also found in some areas. These softer rocks would once have been sand, mud and laid down on a sea floor. Mudstone and limestone are found on Maria Island and the Freycinet Peninsula. The fossil rich limestone cliffs of Maria Island provide an amazing glimpse into the world's history revealing sea fans, clams and sea lilies deposited in the sea around 300 million years ago. The Lowlands are a mix of rock types and sediments such as sandstone and siltstone and sands, gravel and mud.

Photo – Alan Morgan

There are a range of geological features of geoconservation significance in GSB including Bluff River and Sand River Sandstone Cliffs/ Caves Complexes, Hellfire Bluff uplifted marine cliff, block slide and topple, Wielangta Slump landform complex, Moulting Lagoon/Great Oyster Bay, Hazards Lagoon Palaeoenvironmental Record, McRaes Isthmus and Earlham Lagoon to name just a few.

The slow erosion of bedrock over time results in the formation of different soil types, which vary depending on the parent material, topography and climate. Soils tend to be deeper in valleys and at the foot of slopes, and shallower on upper slopes and crests. Soils vary in chemical and physical properties.

Dolerite is generally intensely jointed and weathers to brown, clayey and rich soils which tend to be more stable. Sandstone weathers to produce sandy, erosion prone and nutrient poor soils and often feature cliff and cave formations. Springs generally occur along the contact lines between the dolerite and sandstone.[29] Mudstone produces erodible clays and loams.[30]

The valleys and estuaries of GSB contain alluvial soils consisting of sand, clay and silt. The flood plains of the Swan Aspley have rich alluvial red-black clay loams with good structure.[31] Sand deposited by the rise in sea level following the end of the last Ice Age has formed beaches, sand bars and lagoons in many places along the coast including the area around the isthmus on Maria Island.[32]

Mapping conducted by the Department of Primary Industries, Water and the Environment has identified a number of areas generally around estuaries and coastal areas as having Potential Acid Sulphate Soils (PASS). [33]In an undisturbed and waterlogged state these soils are harmless, but when disturbed and/or exposed to oxygen through drainage, excavation or climate change, a process of oxidation can produce large quantities of sulphuric acid. As acid moves through the soil it releases heavy metals and other toxins which have the potential to reduce water quality, kill fish and damage sensitive ecosystems.[34]

Soils host important soil-based bacteria and fungi, store carbon in the form of organic matter and are critical for the health of natural ecosystems and agricultural and horticultural industries.

Soil based lifeforms such as fungi play a key role in supporting plant functions and soil health (Mohammed et al 2017). Fungi help break down logs, leaves and other organic matter making these nutrients available for other animals and plants to use. Other fungi have close symbiotic relationships with plants, allowing both the host plant and the fungus to benefit by exchanging nutrients. Plants such as our endangered native orchids rely on mycorrhizal fungi for germination and survival.

While some characteristics of soil can be changed by good management, it is important that these practices are sustainable and do not contribute to the decline of the soil or land.

Soil type, the nature of the land surface or topography, the slope and aspect of the land, as well as climate and climate variability all play a big role in what can be sustainably grown in the GSB LGA.

29 Gee 1995 in D'Emden 2002
30 Steane et al 1995
31 GSBNRMC 2013
32 D'Emden 2002
33 GSBNRMC 2013
34 GSBNRMC 2013

Buckland. Photo – GSBC

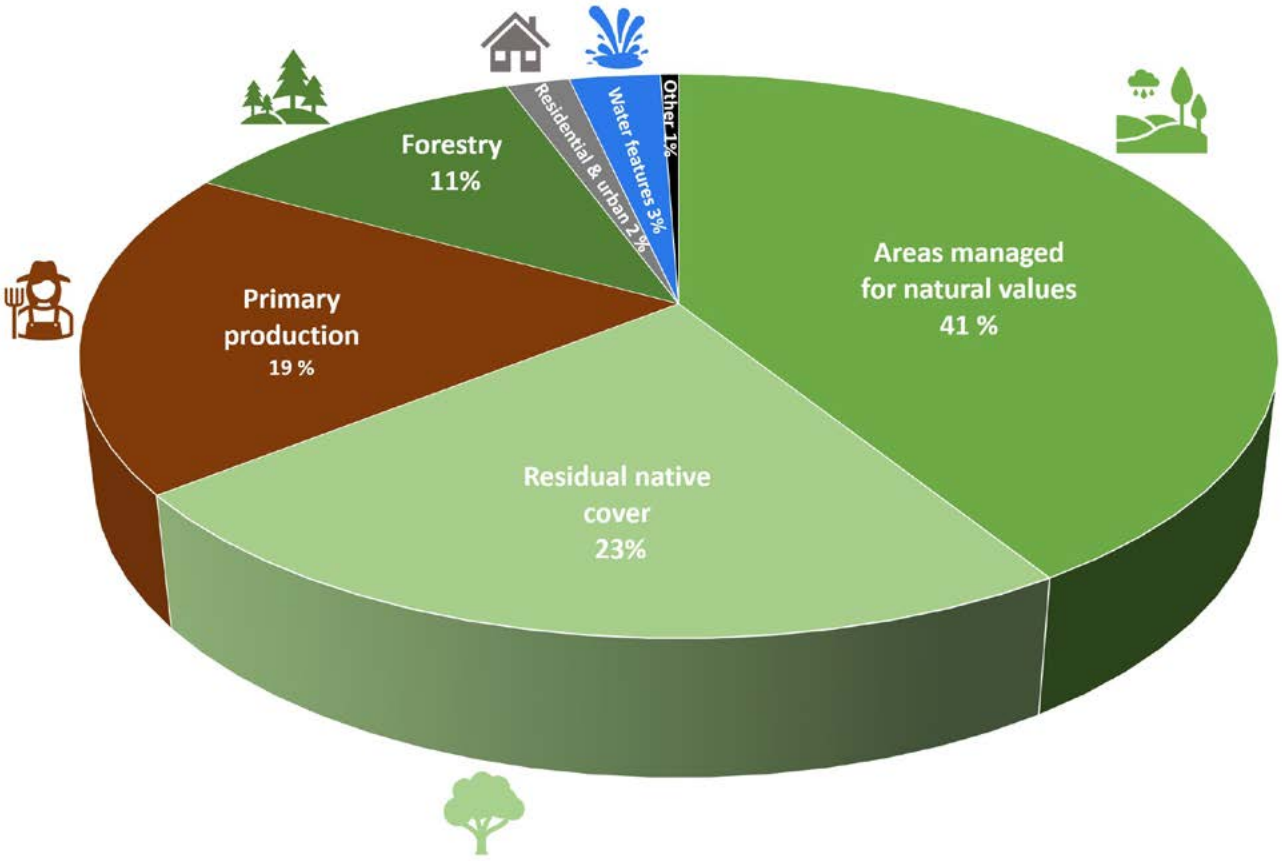


Figure 7 – Main land use groups in Glamorgan Spring Bay (Source The List Land Use 2021)

Figure 7 shows the different land uses as a percentage of the total Glamorgan Spring Bay Council area.

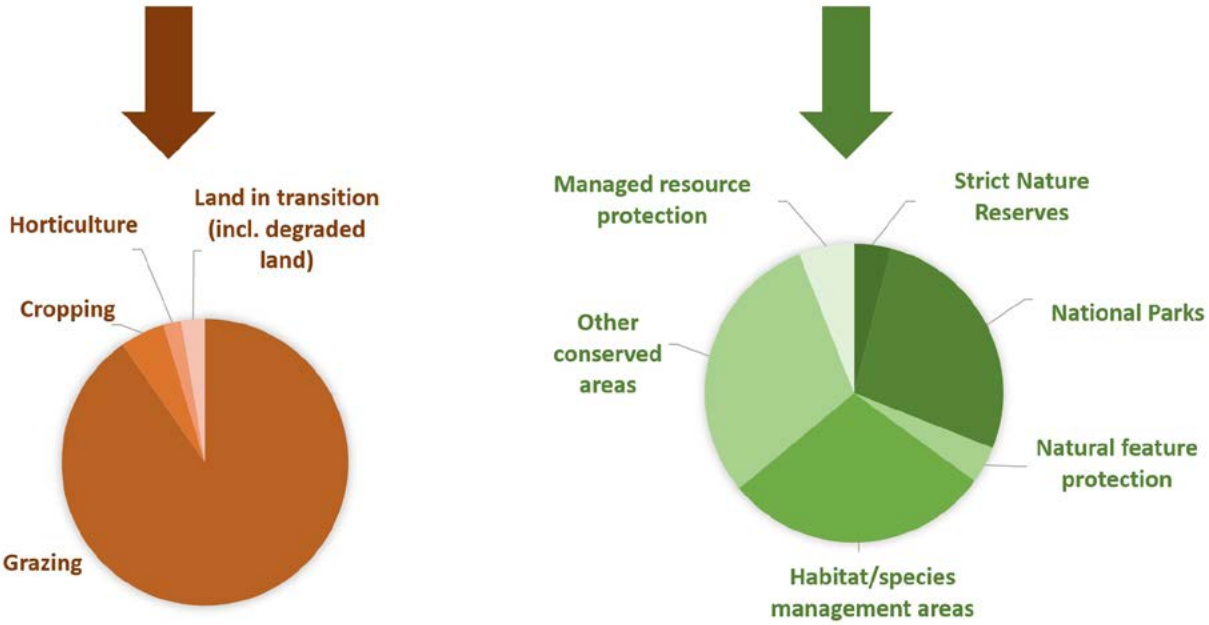


Figure 8 Breakdown of main land uses for primary production and areas managed for natural values in Glamorgan Spring Bay (Source The List Land Use 2021)

Figure 8 shows the breakdown of primary production and areas managed for natural values based on land use.

41 % of the Glamorgan Spring Bay land area is managed for conservation and a further 23% is residual native cover used for non-production or environmental purposes. Primary production makes up 19% of the land use, with grazing being the predominant use. Over a quarter of these grazing areas have native vegetation cover. Native grasses tend to be more resilient, recovering more quickly after dry periods.

5% of the land is used for crops and 2% is use for perennial horticulture with grapes and tree nuts being favoured. These uses are largely consistent with land capability modelling for the region. Land in transition which is largely degraded land may indicate that the management regime of more marginal lands is changing.

Land capability is an internationally accepted method of ranking the ability of land to support a range of broadacre agricultural activities on a sustainable basis. In Tasmania 1 is the best and 7 the worst. Knowing the capability of an area provides a basis for effective planning and sustainable soil management practices.

Most land in GSB is ranked between 4 and 6,[35] making it a landscape requiring careful management. Areas ranked 4 are well suited to grazing but only occasional cropping, or a very restricted range of crops. Areas ranked 5 are unsuited to cropping with some limitations to grazing. Areas ranked 6 are only marginally suited to grazing. A pasture versatility index indicating the land's suitability to support more pasture species than other areas, varied in different areas.[36] The highest scores were in areas north of Cranbrook, in the Buckland area with other pockets along the foothills of the eastern tiers.

In 2002, farmers began working with the Tasmanian Institute of Agriculture (TIAR) to investigate drought tolerant pasture species for dryland grazing on the east coast. The project aimed at increasing productivity and persistence during dry periods to make the land less vulnerable to erosion and weed invasion during drought.

The introduction and spread of pests, weeds and diseases are a major threat to productivity in Glamorgan Spring Bay. Grasses such as serrated tussock and Chilean needlegrass have huge impacts on livestock productivity.

Economic pressures on dryland grazing have led many farmers to diversify into different areas that require irrigation such as cropping and horticulture. Horticultural enterprises in

35 The List 2005
36 The List 2021

Photo - Alan Morgan

the region rely on irrigation, as do a small percentage of modified grazing pastures and some cropping. It is important to monitor soil health in areas under irrigation as irrigation is a driver for increased soil compaction. Soil compaction can reduce agricultural productivity and is more likely where irrigation methods combine with low crop diversification, intensive grazing and low organic content.[37]

At present GSB is fortunate to have a few, relatively small areas that are affected by salinity. Salinity affects production and also puts freshwater systems such as wetlands and lowland plains and river flats at risk. These areas already contain some of our most endangered vegetation types.[38] Salinity develops slowly over time, and as prevention is cheaper than remediation, ongoing monitoring is essential.

An Enterprise Versatility Index[39] to identify how well-suited areas are to different agricultural and horticultural enterprises, showed that many crops are not suitable for the GSB area. Sparkling wine grapes, table wine grapes and linseed are the most suitable, most crops requiring some form of soil management and frost protection. Perennial grasses such as drought tolerant varieties of fescue and cocksfoot, and Phalaris appeared most suitable in the area.

According to Climate Futures for Tasmania projected changes to the climate will have significant impacts on agricultural enterprises at farm, industry and regional scales. The projected increases in both minimum and maximum temperatures are likely to require changes to agricultural practices, including changes to crop choices, reduced time to crop maturity, changes to crop yields and crop quality, and changes in the incidence and severity of weeds, pests and diseases. Farm management, choice of crops and land use could all change substantially because of these impacts.

37 Shah et al 2017
38 Bastick & Walker 2000
39 The List 2021

In Bicheno community volunteers have been tackling weeds such as boneseed and mirror bush. Photo - Nigel Palfreyman

Changes in climate will promote the southward movement of weeds, pests and diseases into Tasmania and also increase the impact of biosecurity risks that can affect primary production and natural asset condition (Derwent Catchment Project 2021). Increasing awareness of weeds, pests and diseases across different industries can help to identify and manage new incursions early.

It is important for different sectors of the community to work together to manage threats to agriculture and the environment.

Threats to sustainable land use

- **Acid sulphate soils** – disturbance of these soils can affect water quality and soil health
- **Climate change** – temperatures, rainfall and extreme weather events that cause wildfires and flooding will impact agriculture and horticulture and will also affect the viability of some crops and livestock
- **Encroachment** - coastal and riparian reserves protect beaches, rivers and property from erosion, salt exposure and flooding. Illegal clearing of public reserves for views, construction of structures, access pathways and dumping of garden waste degrade these natural areas, leaving them vulnerable to wind and wave erosion and negatively impacting important habitat. Many of these areas contain Aboriginal Heritage sites telling the story of thousands of years of Aboriginal history. These sites are protected by law

- **Erosion** – flood and wind erosion can result in loss of soil and damage to natural areas and built infrastructure. Vegetation removal and soil disturbance can increase the risk of erosion.
- **Game and native animal browsing** can lead to changes in soil structure and loss of groundcover leading to soil loss and erosion
- **Salinity** – vegetation removal can cause an in increase in salt level on land and in waterways. Retaining and regenerating native vegetation and maintaining deep rooted perennial pasture cover with a conservative stocking rate can help combat salinity. Ensure dams, houses and septics are not built in areas where the water table is high and avoid construction activities that are likely to disrupt the water table. Regular soil and water testing can help identify issues early.
- **Soil compaction** - negatively impacts soil health and should be monitored in areas under irrigation
- **Storm events and inundation** – rapid changes in water levels in freshwater and marine systems can affect soil and water quality, as well as reshaping areas, causing slumping and recession
- **Vegetation removal and inappropriate grazing regimes** can lead to declines in soil structure and carbon, as well as soil loss and erosion. Adoption of containment feeding/drought-lotting and using perennial pastures can help improve dryland grazing management.
- **Water** – water supply and security are essential – encourage practices to conserve water– retain ground cover and plant shelterbelts to provide shade and reduce evaporation
- **Weeds, pests and diseases** – biosecurity, including good hygiene practices, is critical to reduce the spread of threats already in the Glamorgan Spring Bay area to prevent new threats entering the catchments. Raising community awareness of different weeds, pests and diseases is important for prevention and management. The movement of soil, feed and livestock needs to be carefully considered and smaller landowners and hobby farmers may not be aware of these risks. For instance, purchase of cheap feed that may contain weed seeds can easily introduce and/ or spread seeds through the municipality. Landscape supplies and quarries need to be diligent as the movement of soil and gravel can provide a pathway for the spread of weeds and diseases. Machinery moving between farms and areas of construction, road and drainage works needs to be washed down before and after changing locations. Visitors need to be aware of biosecurity risks associated with movement of fruit and vegetables, and of the importance of cleaning clothing and equipment when moving between areas.

Follow up is key to successful weed management. With limited resources, it is important for stakeholders to work together to ensure weeds incursions and control activities are monitored and that follow up weed control occurs regularly. Making sure previous efforts are not wasted.

The Glamorgan Spring Bay Weed Management Plan 2015-2020 outlines actions for managing weeds in GSB. This plan is currently under review.

Conservation detection dog Fonz has been used to find serrated tussock. Photo - Mel Kelly

White-tailed mouse. Photo - Andy Welling

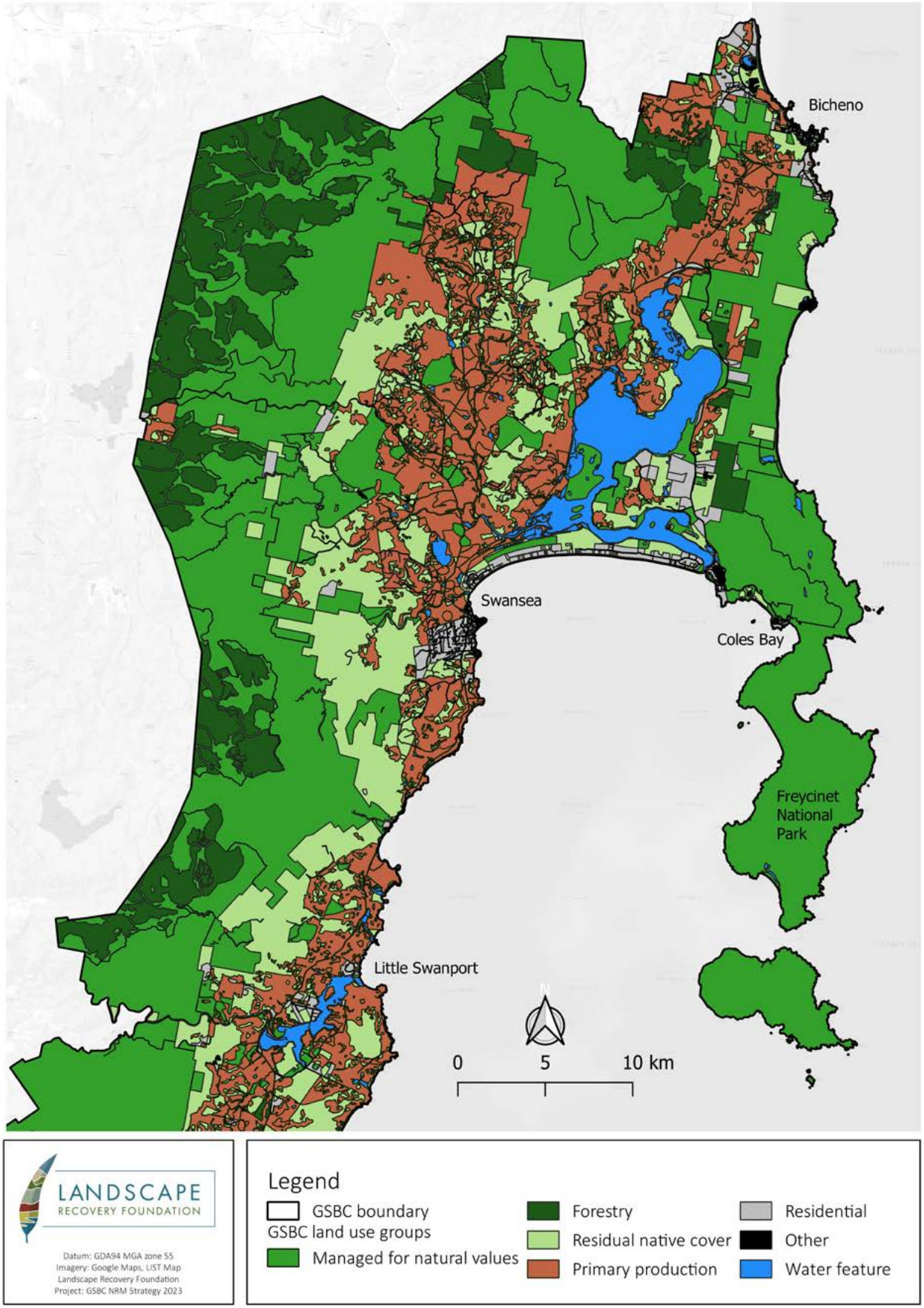


Figure 9 – Northern section of Glamorgan Spring Bay LGA showing land use groups (Source The List Land Use 2021)

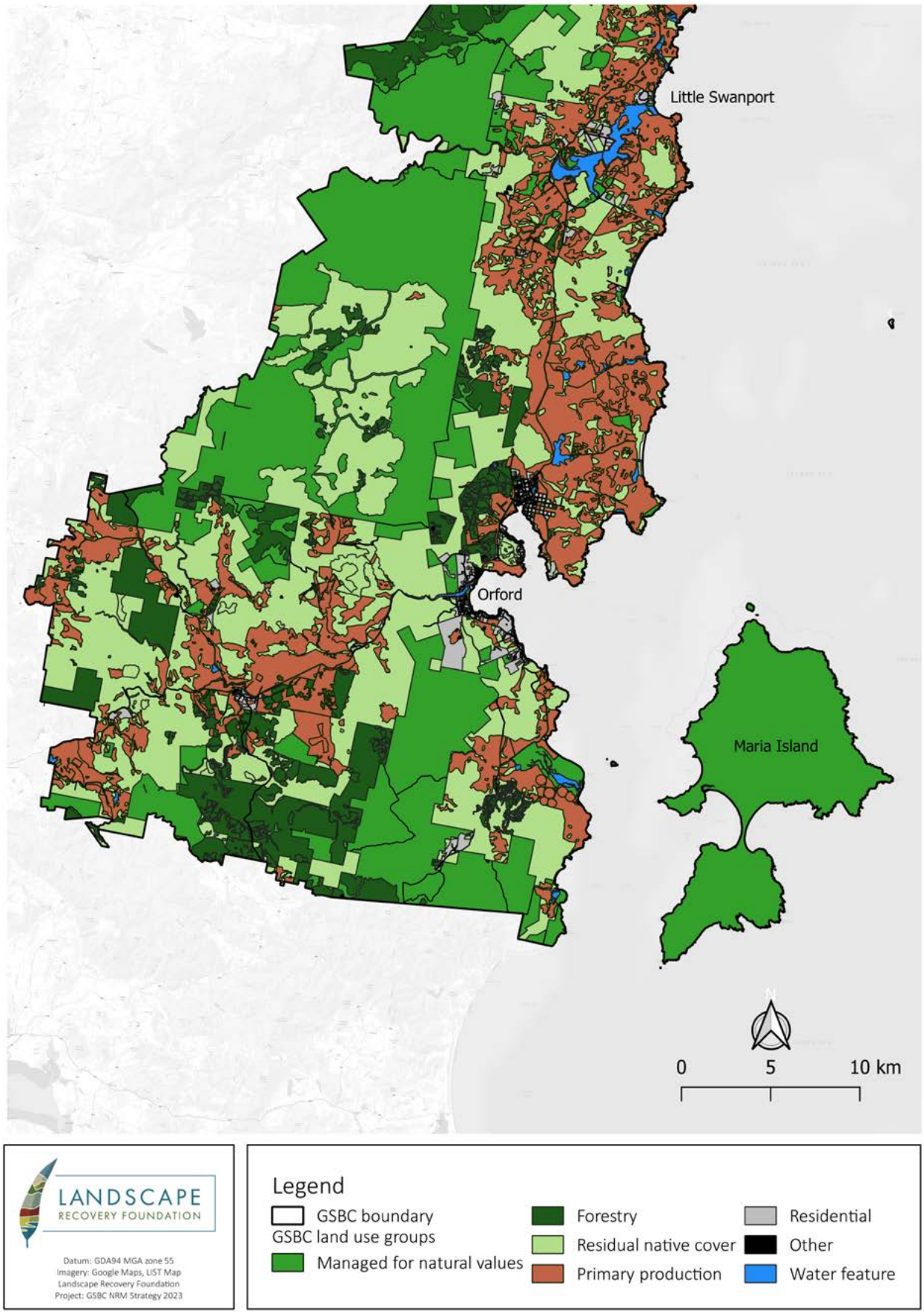


Figure 10 – Southern section of Glamorgan Spring Bay LGA showing land use groups in 2021 (Source The List Land Use 2021)

Photo - Alan Morgan

Managing our land

3. LAND				
OBJECTIVE: To improve land condition and management outcomes to facilitate long-term sustainability				
Goal	**Action**	**Measures of success**	**Priority**	**Time-frame**
3.1 Maintain/ improve ground cover and remnant vegetation	3.1.1 Encourage and support land management practices that reduce soil erosion	3.1.1.1 Two (2) sustainable management workshops to different target audiences -small farms and large farm enterprises by 2026	H	M
		3.1.1.2 Funding is secured and two significant agri-best practice projects are underway by 2025		
		3.1.1.3 - 10% increase in vegetation cover of degraded areas by 2028		
		3.1.1.4 - 10% increase in shelter Belts by 2028		
		3.1.1.5 - 30% increase in use of containment feeding during dry periods by 2028		
		3.1.1.6 - 20% increase in the use of drought tolerant perennial pasture species by 2026		
		3.1.1.7 - 10 % increase in retention of remnant vegetation by 2028		
	3.1.2 Manage animal browsing	3.1.2.1 Ten farming enterprises with game management plans adopted and being implemented by 2028	M	L
	3.1.3 Advocate for deer to be declared as pests	3.1.3.1 Deer free zones established where deer do not have protected status	M	L

Table 5 Action table for managing land resources.

Priority H- High, M-Medium, L-Low.

Timeframes: S - Short 1-2 years; M- Medium 3-5; L – Long 5+ years

3. LAND (Continued)				
OBJECTIVE: To improve land condition and management outcomes to facilitate long-term sustainability				
Goal	**Action**	**Measures of success**	**Priority**	**Time-frame**
3.2 Manage soils sustainably	3.2.1 Build understanding of appropriate land use for soil types and slope/aspect for small farms	3.2.1.1 - 10% increase in awareness of the LIST's enterprise suitability and land capability mapping information by 2025	M	S
		3.2.1.2 - Funding secured to support small farm holders to undertake land capability assessments by 2025		
	3.2.2 Improve awareness of acid sulphate and dispersive soil issues and recommended management	3.2.2.1 - Best practice information about acid sulphate and dispersive soils distributed to construction contractors, architects & designers, project managers and developers annually	M	S
		3.2.2.2 - Council understands the risk of acid sulphate and sodic soils & disturbance associated with development, and is using available information to support decision-making		
3.3 Understand and manage biosecurity risks	3.3.1 Implement Glamorgan Spring Bay Weed Management Plan	3.3.1.1 - 80% implementation of weed management plan actions for each year	M	L
	3.3.2 Coordinate a collaborative cross-tenure weed management program	3.3.2.1 - Council weed officer position maintained	M	M
		3.3.2.2 - Key stakeholders meet annually to agree on an annual collaborative weed management program		
		3.3.2.3 - Key stakeholders contribute resources to implement annual weed program		
		3.3.2.4 - 10% increase in area of weeds controlled across land tenure by 2026		
		3.3.2.5 - Annual follow up of priority weed projects		

3. LAND (Continued)				
OBJECTIVE: To improve land condition and management outcomes to facilitate long-term sustainability				
Goal	**Action**	**Measures of success**	**Priority**	**Time-frame**
	3.3.3 Support involvement in priority weed control programs such as the Serrated tussock and Chilean needlegrass control programs	3.3.3.1 - Priority weed control programs implement annual works in the Glamorgan Spring Bay Municipality	M	M
	3.3.4 Encourage good hygiene practices at quarry and extraction sites	3.3.4.1 - Audit of local quarries for weed and *Phytophthora* undertaken by 2025	H	M
		3.3.4.2 - Good hygiene guidelines distributed to contractors		
		3.3.4.3 - Ensure weed control is undertaken at quarry sites as a priority		
3.4 Land managers are better prepared for climate change and other disruptive events	3.4.1 Plan for biosecurity risks associated with climate change - weeds, pests and diseases	3.4.1.1 - Funding is secured to develop cross-tenure, cross-industry biosecurity plans for GSB by 2025	M	M
		3.4.1.2 - Biosecurity plans in place by 2027		
	3.4.2 Promote practices that reduce carbon emissions	3.4.2.1 - Program delivering carbon advice for producers by 2024	M	M
	3.4.3 Prepare for bushfire and flood events	3.4.3.1 - Work with SES to deliver workshops for flood and fire resilience planning, 2 workshops by 2025	H	S
	3.4.4 Prepare for pandemics and other disruptive events	3.4.4.1 30% of primary producers have business continuity plans in place by 2028	M	S

Tree hollows provide important habitat. Photo - Jim Mulcahy

Biodiversity

Biodiversity is important for our health and wellbeing and for climate resilience. Healthy vegetation and plant communities provide a buffer against erosion and inundation. Morton & Hill (2014) described some of the important values biodiversity provides.

- For our economy – biodiversity provides raw material for food and fibre production. The livelihoods of farmers, fishers and timber workers are dependent on it.
- Supporting ecological life – biodiversity provides what we call ecosystem services which include supplying oxygen, regulating climate, cleaning air and water, pollinating plants, controlling pests and diseases, processing nutrients, and treating wastewater.
- For recreation – many of our favourite recreational activities such as bushwalking, fishing, birdwatching and camping rely on our unique biodiversity. Tourists come to Tasmania to experience the wide range of environments that our rich biodiversity offers.
- Cultural significance – Biodiversity is strongly linked to our Australian culture. For some it contributes to our identity, for others an appreciation of its beauty is inspiring. For many it provides a spiritual connection. Indigenous Australians have strong spiritual connections to the land, the animals and plants it supports, and to caring for country.
- For science – biodiversity provides insights that improve our understanding of the natural world, its origins and how it functions.

- Glamorgan Spring Bay is part of the South-East bioregion which is characterised by a varied coastline with bays, sandy beaches, headlands, cliffs and rocky shores, and broad expanses of hilly country capped with dolerite rock. The vegetation is dominated by eucalypt woodlands, eucalypt open forests, tall open forests and native grasslands, some of which have been derived from grassy woodland communities by tree clearing and/or burning. The region has a range of marine habitats.

Glamorgan Spring Bay is home to significant plants, animals and their communities. Appendix C has a list of plant communities and threatened species found in Glamorgan Spring Bay.

Glamorgan Spring Bay has a high number of plants found only on the east coast of Tasmania and nowhere else in Tasmania or the world. These plants are referred to as being "locally endemic".

Freycinet wax flower *Philotheca freyciana* in only found on the Freycinet Peninsula. Photo - Eve Lazarus

Locally endemic bordered heath, *Epacris limbata*, is only found in a small part of the Swan Aspley catchment – root rot fungus poses the main threat to this critically endangered plant. Photo - DNRE

Animals, plants and fungi that are threatened can be listed as rare, vulnerable, endangered, or extinct under the *Tasmanian Threatened Species Protection Act (TTSP) 1995*, and/or as vulnerable, endangered, critically endangered, under the *Commonwealth Environment Protection and Biodiversity Conservation Act (EPBC) 1999*. These species are considered to be of conservation significance. A full list of threatened species found in Glamorgan Spring Bay can be viewed in Appendix C.

Two types of fungi found in Glamorgan Spring Bay are considered threatened.

184 species of plants found in Glamorgan Spring Bay are listed as threatened under the TTSP Act. 30 of these plant species are also listed under the EPBC Act. Dieback caused by the root rot fungus *Phytophthora cinnamomi*, land clearance and inappropriate fire regimes are key threats for heath species such as the critically endangered bordered heath, *Epacris limbata*, and other endangered heath species such as bearded heath, *Epacris barbata*. Loss of climatic habitat due to climate change is also a potential threat. These heath species are endemic to Tasmania and have very limited distributions within the state. Their limited distribution makes them particularly susceptible to landscape changes.

The Tasmania devil. Photo © Eric Woehler

59 species of threatened fauna have been recorded in Glamorgan Spring Bay, 42 of these are listed nationally. These include a number of insects, other invertebrates reptiles and amphibians and mammals.

We know that many plant species rely on specific insects for pollination, however there are many gaps in our understanding of invertebrates and their roles in ecosystem function. There are also invertebrate species still to be discovered and described. Habitat loss, fragmentation, and disturbance, inappropriate fire regimes (generally too frequent and too hot), firewood collection and illegal collection of insects are key threats. Retaining cutting grass, coarse woody debris, leaf litter layers, and managing forest structure to enhance habitat complexity will benefit many species and help retain biodiversity.

Human disturbance and habitat loss are shared threatening processes for many birds. Others include degradation of waterways from pollution, changes to the water regimes, invasive plants and lack of suitable nesting hollows. Birds of prey are also prone to impacts from collisions, powerlines and poison.

Retaining native bushland and suitable nesting sites and hollows and connecting forest corridors are essential. For birds like the grey goshawk retaining mature native wet forest and forest vegetation along water courses is key. [40]

GSB contains several important sites for beach-nesting seabirds such as Fairy tern, *Sternula nereis*, as well as populations of beach-nesting shorebirds such as Hooded plover Thinornis cucullatus, Red-capped plover *Charadrius ruficapillus* and Pied oystercatcher *Haematopus longirostris*. All these species are susceptible to changes in coastal processes as a result of a changing climate, as well as conflict with recreational uses of their habitat. The overlap of their breeding with the seasonal increase in people and dogs present on beaches during

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summer presents challenges to taking action to ensure sustainable populations. The dispersed nature of the populations also means that action to protect these species needs to be widespread rather than prioritise a small number of sites.

Hooded Plover. Photo © Eric Woehler

The iconic Tasmanian devil, *Sarcophilus harrisii*, is amongst the threatened species found in GSB. Devil numbers have declined by more than 80% since the mid-1990s due to a transmissible facial tumour disease. The new holland mouse *Pseudomys novaehollandiae*, is listed as endangered in Tasmania due to habitat loss and modification due to inappropriate fire regimes and coastal development.[41] The presence of introduced species such as mice and cats have also impacted native animals.

Changes to water flow and quality and introduced fish such as trout and redfin perch have led to species such as the freshwater Swan galaxias *Galaxias fontanus* becoming endangered. Streams supporting healthy populations of the Swan galaxias are all protected from trout invasion by some form of barrier (waterfall, marsh, small channel).[42]

The Australian grayling Prototroctes maraena is a native fish that migrates between fresh and marine waters. Adults live and breed in freshwater rivers, and the larvae are swept downstream into coastal waters. It is thought is that the species' range has contracted substantially in recent years, and this is largely due to the construction of barriers to fish movement which prevent adults migrating upstream and larvae moving downstream.[43]

Barriers such as dams can prevent species such as these lampreys moving upstream. Photo - Mel Kelly

In Tasmania, we are fortunate to have many birds and mammals absent from the mainland because we do not currently have foxes and wild dogs. Feral, domestic and game animals can have impacts on our local fauna, native plant communities, and on farm stock and crops.

Cats and dogs impact native animals. Lambs and calves are also vulnerable to attack. Cats are hunters by nature and can have huge impacts on nesting birds and small mammals. Rabbits impact farmlands and saltmarshes.

41 TSS 2023
42 TSS 2023
43 TSS 2023

Fallow deer, *Dama dama*, were introduced to Tasmania as a target for recreational hunters. Deer can be very destructive in native ecosystems, selectively browsing the tender growth of seedlings, which over time alters the vegetation community structure, and therefore its ability to support native animals. They also cause significant impacts on agricultural, viticultural and walnut enterprises, grazing on valuable stock fodder, vines and plantation trees.[44] In recent years, deer numbers have escalated particularly on Tasmania's east coast. Impacts are particularly heavy after bushfires when deer nibble on tender shoots of regenerating native vegetation.

European wasps, bumble and honeybees, and sugar gliders also impact native plants and animals.

Threatened Native Vegetation Community	TASVEG CODE	TNCV number
Allocasuarina littoralis forest	NAL	2
Callitris rhomboidea forest	NCR	11
Eucalyptus amygdalina forest and woodland on sandstone	DAS	14
Eucalyptus amygdalina inland forest and woodland on cainozoic deposits	DAZ	15
Eucalyptus globulus dry forest and woodland	DGL	17
Eucalyptus ovata forest and woodland	DOV	20
Eucalyptus tenuiramis forest and woodland on sediments	DTO	22
Eucalyptus viminalis - Eucalyptus globulus coastal forest and woodland	DVC	23
Eucalyptus viminalis wet forest	WVI	25
Melaleuca ericifolia swamp forest	NME	30
Melaleuca pustulata scrub	SMP	31
Notelaea - Pomaderris - Beyeria forest	SBR	32
Rainforest fernland	RFE	33
Riparian scrub	SRE	34
Seabird rookery complex	GHC/SCH/ SRH	35
Wetlands	AHF/AHL/ AHS/ASF	39

Table 6 Threatened vegetation communities found in Glamorgan Spring Bay TNVC 2020

In Tasmania, native vegetation communities considered to be threatened are listed under Schedule 3A of the *Nature Conservation Act 2002*. Sixteen threatened plant communities are found in Glamorgan Spring Bay are included in the following table. A description of these communities is found in Appendix C.

Four ecological communities found in GSB are listed as threatened under the Commonwealth *EPBC Act*, these are *Eucalyptus ovata-Callitris oblonga* forest (vulnerable), lowland native grasslands of Tasmania (critically endangered), subtropical and temperate coastal saltmarsh (vulnerable) and the giant kelp marine forests of South East Australia (endangered).

44 GSBNRMC 2013

Grassland areas are important for ecosystem function in lowland agricultural regions.[45] Threats to remaining native grassland areas are fragmentation, weed invasion and land-use change.

Wetlands are made up of aquatic plants that grow in water for at least part of the year. They can occur in fresh, slightly salty (brackish), or salty or saline water. The level of salinity influences the type of wetland. Wetlands can be interconnected and vary in depth from just a few centimetres to several metres.[46]

Wetlands are among the most productive native ecosystems in Tasmania. They are stopover points for migratory birds and breeding grounds for fish, frogs, water birds and invertebrates. They also filter water and disperse heavy flow in times of flood. Many threatened species of plants and animals occur in Tasmania's threatened Wetlands including several sedge, rush, and herb species.[47]

GSB contains two international significant Ramsar wetlands at Moulting Lagoon and Apsley Marshes, as well as other high conservation value wetland areas such as Earlham Lagoon, Bougainville, Wattle Paddock Creek and areas around, Hermitage, Swansea/Dolphin Sands and the Rostrevor dam.

Moulting Lagoon is a large wetland at the northern end of Great Oyster Bay that supports threatened and significant vegetation communities and flora. Moulting Lagoon provides year-round habitat and breeding sites for around 80% of Tasmania's black swan population.

Other Tasmanian waterfowl and shorebirds, as well as many international migratory birds, utilize the lagoon's habitat for refuge and/or breeding at different times of the year.

The Moulting Lagoon Game Reserve is currently used for the licensed hunting of a number of duck species between March and June.[48]

The Apsley Marshes adjoin the northern shores of Moulting Lagoon and are largely on private land. They form a complex system of freshwater marsh and intertidal saltmarsh that supports ten different wetland plant communities. The Aspley Marshes are amongst the most floristically diverse wetlands in Tasmania, supporting several threatened plants, including the swamp everlasting, *Coronidium gunnianum*. This area provides important for a variety of birds including the threatened Australasian bittern, *Botaurus poiciloptilus* and white-bellied sea-eagle, *Haliaeetus leucogaste*. It is a migratory route for short-finned eels, *Anguilla australis* and the threatened Australian grayling, *Prototroctes maraena* as well as spawning habitat for black bream, *Acanthopagrus butcheri*.[49]

Salt marshes such as the succulent saline herblands at Moulting Lagoon are a threatened wetland community. Saltmarshes are critically important habitats that support biodiversity, sequester carbon and attenuate global warming, increase coastal food production, and provide feeding, resting and nursery habitat for fish. By filtering nutrients and settling sediments, saltmarshes are also important for maintaining and improving coastal water quality that also supports recreational activities.[50]

Wetlands can be easily disturbed and damaged by livestock grazing and trampling, drainage works, vehicle use and fire. Surrounding land uses can pollute wetlands and change their normal flooding and drying cycles.[51] Weeds are also a threat.

Eucalyptus globulus dry forest and woodland.
Photo – Nick Fitzgerald

45 DPIPW&E 2010
46 DNRE2022
47 DNRE 2022
48 GSBNRMC 2013
49 GSBNRMC 2013
50 Prahalad & Pearson, 2013 in Visby, Prahalad 2020
51 DNRE 2022

Grassland and wetland communities form part of a cultural landscape reflecting thousands of years of Aboriginal use and land management. Numerous Aboriginal heritage sites are recorded in the Moulting Lagoon area.[52]

Not only is it important to maintain and improve threatened plant communities, it is also important to retain and enhance connectivity between bushland areas to provide corridors for wildlife and buffers for plant communities. Many species cannot or will not travel across cleared open ground between suitable areas of habitat. Wildlife corridors that link areas of native vegetation are important for preserving biodiversity in the landscape. For insects such as the broad toothed stag beetle, creating linkages between beetle populations will improve its chances of survival.[53]

Conservation covenants and reserves on private land provide landowners with an opportunity to protect natural areas. The Tasmanian Land Conservancy (TLC) has numerous reserves in Glamorgan Spring Bay and also works with landholders through the Land for Wildlife Program and their revolving fund to encourage land holders to monitor and actively manage land for biodiversity values. The TLC have noticed a change in community attitudes with more people interested in understanding and looking after land for its natural values.[54]

In addition to their intrinsic value, areas of remnant vegetation also provide important reference points for rehabilitating degraded areas. Encouraging landholders and land managers to work together to retain, enhance and/or link natural areas would increase connectivity, address fragmentation and build climate resilience. Priority should be given to bushland areas that are still in good condition and where landholders express a willingness to actively manage the areas for their natural values[55].

Figures 11 and 12 show reserved areas in Glamorgan Spring Bay. The reserves mapped include formal and informal reserves on both public and private land. The figures also highlight the areas where threatened vegetation communities occur outside the reserves. The light green squares indicate areas identified by Fitzgerald in 2016 as having high biodiversity values.

Using systematic conservation planning software, Fitzgerald's analysis overlayed a wide variety of biodiversity values including threatened and under-reserved native vegetation, threatened species habitat, freshwater ecosystem values and refugia. The process aimed to consolidate high priority areas by identifying connections and buffers and map indicative locations of viable reserves or conservation management zones across the landscape.

Three focus areas are indicated by the dashed lines in Figures 11 & 12. These are areas identified as having high biodiversity values where there have been existing efforts to manage natural values and/or, where it would be useful to work with existing or new landholders to ensure the natural values are understood and managed into the future. They are indicative only and are outlined as a starting point for further conversations.

52 GSBNRMC 2013
53 TSSC 2019
54 TLC 2023
55 N Fitzgerald 2016

Wallaby. Photo - Alan Morgan

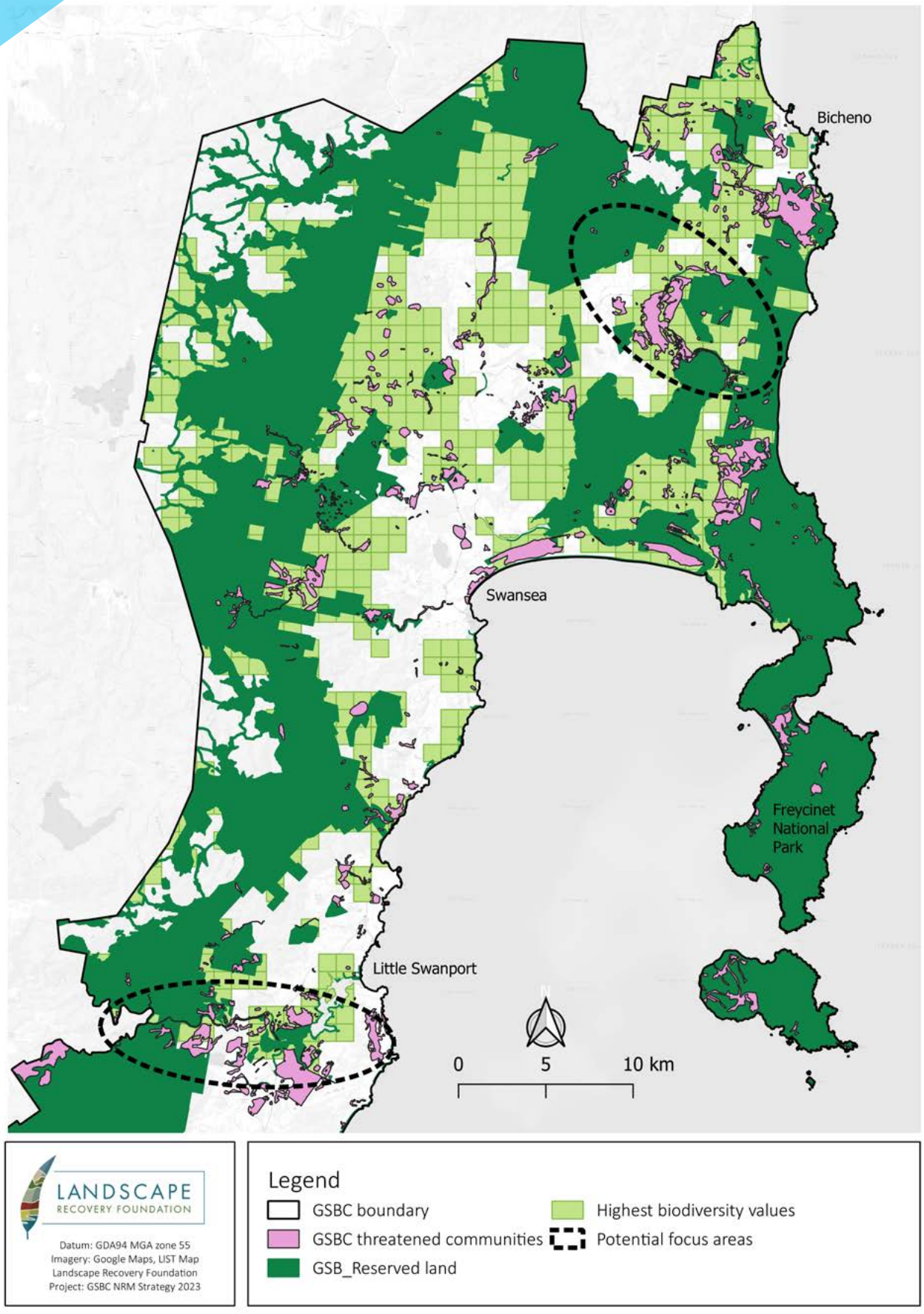

Figure 11 Northern section of GSB showing reserved areas, threatened communities, and areas of high biodiversity. It also highlights some potential focus areas for supporting landholders to manage areas for natural values.

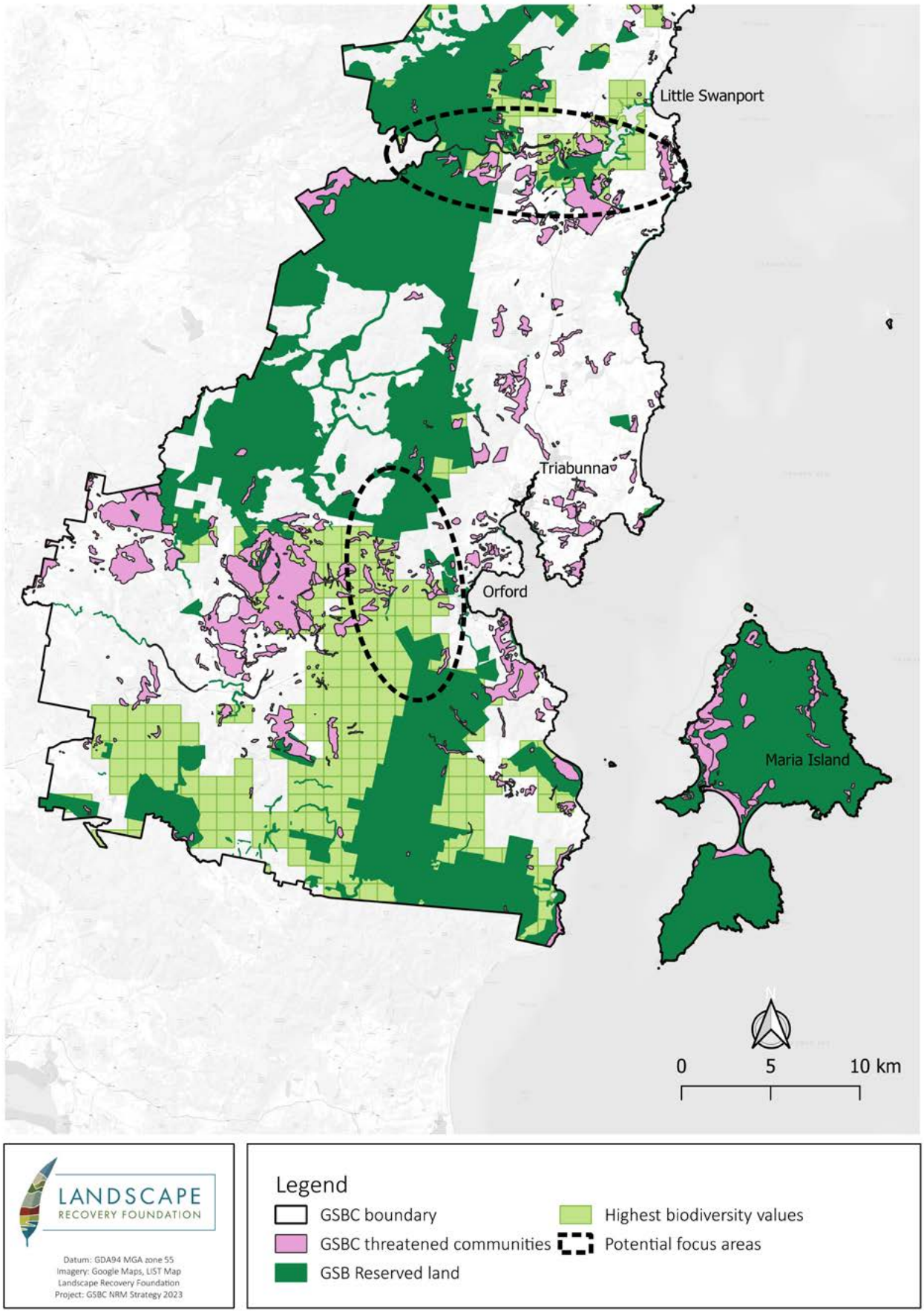

Figure 12 Southern section of GSB showing reserved areas, threatened communities, and areas of high biodiversity. It also highlights some potential focus areas for supporting landholders to manage areas for natural values.

Pied oyster catchers. Photo © Eric Woehler

Threats to biodiversity:

- Clearance of native vegetation - continues to be the largest single pressure on biodiversity values.[56]
- Impacts of pests, weeds and diseases – root rot fungus and weeds such as serrated tussock have the potential to devastate natural areas
- Degradation of water systems
- Inappropriate use of fire and slashing
- Inappropriate and illegal harvesting – wood hooking or the collection of firewood on private and public land without appropriate permission impacts vegetation communities and biodiversity. The removal of dead or fallen trees and branches impacts on animals that rely on tree hollows and older logs for habitat, nesting and shelter
- Impacts of stock
- Browsing pressure from game and native animals
- Inappropriate vehicle access and trampling
- Impacts from feral and unmanaged domestic animals
- Climate change.

56 DPIPWE 2010

Waterfall. Photo : Howard Colvin

Managing our biodiversity

4. BIODIVERSITY				
OBJECTIVE: To maintain and improve biodiversity				
Goal	**Action**	**Measures of success**	**Priority**	**Time-frame**
4.1 Maintain and/or improve the condition of native vegetation and habitats for flora and fauna	4.1.1 Develop a baseline understanding of vegetation condition	4.1.1.1 - A baseline developed for the municipality using existing and new data by 2025	H	M
		4.1.1.2 - 10% increase in vegetation condition by 2028		
	4.1.2 Develop closer cooperation and collaboration between key land managers such as Glamorgan Spring Bay Council and Tasmania Parks & Wildlife Service (including Property Services)	4.1.2.1 Management agreements in place with PWS - Property Services to enable community participation on public land by 2024	H	S
	4.1.3 Continue to improve our knowledge of Glamorgan Spring Bay's biodiversity	4.1.3.1 Annual increase in records on the Natural Values Atlas (NREs database for flora and fauna)	L	L
	4.1.4 Improve fire management regimes to balance managing natural values with reducing fire risk	4.1.4.1 Distribute information about tolerable fire intervals annually	M	M
		4.1.4.2 Property owners notified and provided information on how to manage vegetation, control weeds and improve natural values by 2024		
		4.1.4.3 Notices served for non-compliance annually across at least 20% of known non compliant properties		
	4.1.5 Control declared weeds on private land and public land	4.1.5.1 List of properties compiled by 2023	H	M
		4.1.5.2 Property owners notified and provided information on how to control and dispose of weeds, what to replant by 2024		
		4.1.5.3 Notices served for non-compliance annually across at least 20% of known non compliance properties		
		4.1.5.4 Increase in control of weeds on private and public land blocks by 2025		

Table 7 Action table for managing diversity.

Priority H- High, M-Medium, L-Low.

Timeframes: S - Short 1-2 years; M- Medium 3-5; L – Long 5+ years

4. BIODIVERSITY (Continued)				
OBJECTIVE: To maintain and improve biodiversity				
Goal	**Action**	**Measures of success**	**Priority**	**Time-frame**
	4.1.6 Support carbon and biodiversity outcomes	4.1.6.1 At least two (2) carbon and biodiversity projects initiated by 2025	M	M
	4.1.7 Support biodiversity conservation programs	4.1.7.1 A program with the primary focus of improving biodiversity conservation is initiated by 2025	M	M
		4.1.7.2 Annual implementation of program is proceeding as planned		
	4.1.8 Encourage community participation in citizen science and awareness-raising activities	4.1.8.1 Increase awareness of the opportunities for participation in citizen science with a targeted comms plan developed by 2024	M	M
		4.1.8.2 Two (2) citizen science events held such as a water bug or bio blitz event		
		4.1.8.3 - Annual increase in community participation in natural values apps such as Redmap (marine species database), iNaturalist etc		
	4.1.9 Advocate for regulation around firewood sales	4.1.9.1 Written advocacy piece by 2025	H	S
	4.1.10 Develop a co-operative program with landholders and land managers to reduce illegal clearing and wood hooking	4.1.10.1 Cooperative compliance program in place by 2026	H	M
	4.1.11 Increase monitoring and compliance activities around illegal activities on public lands including unauthorised clearing, accesses, structures, storage and rubbish dumping	4.1.11.1 Stakeholder collaboration around monitoring and compliance	M	L

4. BIODIVERSITY (Continued)				
OBJECTIVE: To maintain and improve biodiversity				
Goal	**Action**	**Measures of success**	**Priority**	**Time-frame**
4.2 Maintain and/or improve the conservation status of threatened species and communities	4.2.1 Work collaboratively to implement actions to conserve local threatened species and communities	4.2.1.1- Identify key actions from recovery plans, conservation advice and conservation plans for threatened species where the majority of the remaining populations are located in GSB or where GSB is a primary location for assisted migration - by 2024	M	M
		4.2.1.2 - Develop management plan(s) to include conservation actions for threatened species and communities within the municipality 2025		
		4.2.1.3 - 50% of actions are implemented in the management plans by 2026		
		4.2.1.4 -Review and update GSBC Flora and Fauna Plans - 1 plan per year		
		4.2.1.5 - Annual actions in the GSBC Reserve Flora & Fauna Plans are implemented		
		4.2.4.6 - Key conservations actions from the Orford Foreshore Management Plan are implemented		
	4.2.2 Advocate for threatened species, biodiversity and climate change resilience	4.2.2.1 - Increased funding and associated resources in the municipality for threatened species/ communities programs by 20% by 2026	M	S
	4.2.3 Increase knowledge of threatened species distributions within the municipality	4.2.3.1 - At least 2 targeted surveys for threatened species at municipal wide level by 2027	M	S
	4.2.4 Promote the importance of and actively protect beaches and waterways as bird habitat	4.2.4.1 - A communications plan developed to support increased awareness of the significance of the coastal areas and waterways as bird sanctuaries by 2024	H	S

4. BIODIVERSITY (Continued)				
OBJECTIVE: To maintain and improve biodiversity				
Goal	**Action**	**Measures of success**	**Priority**	**Time-frame**
	4.2.5 Promote responsible pet ownership	4.2.5.1 Increase in number of desexed and microchipped cats and dogs.	H	S
		4.2.5.2 Decrease in reports of stray dogs and feral cats.		
	4.2.6 Facilitate the implementation of the Tasmanian Cat Management Plan to manage domestic, stray and feral cats	4.2.6.1 Support dissemination of Tassie Cat information in Glamorgan Spring Bay	H	S
	4.2.7 Promote the importance of dogs on leads in sensitive areas such foreshores and wetlands, and dog exclusion areas as needed to protect sensitive wildlife areas	4.2.7.1 Develop a targeted communications program to all registered dog owners on the potential impacts of dogs on sensitive areas annually to be distributed with rates notices/or dog registration renewals by 2024	H	S
	4.2.8 Support and/or investigate translocation programs to allow for assisted migration of threatened species and plant communities	4.2.8.1 - Translocation programs being implemented in GSBC by 2026	L	L
	4.2.9 Collect seed for the Tasmania Seed Conservation Centre to ensure genetic diversity of different plant populations are conserved and available for restoration and conservation works where appropriate	4.2.9.1 - Increase in seed from GSB being stored in the Tasmanian Seed Conservation Centre by 2026	M	M
	4.2.10 Ensure that appropriate provenance is used in restoration activities	4.2.10.1 - Suppliers with local provenance identified and information distributed to community and land managers by 2027	M	M
4.3 Improve and maintain connectivity of habitat for flora and fauna species	4.3.1 Support landholders to retain and/or restore vegetation for wildlife corridors	4.3.1.1 At least 3 media items are produced to communicate with the community on important areas for wildlife corridors in the Municipality		

4. BIODIVERSITY (Continued)				
OBJECTIVE: To maintain and improve biodiversity				
Goal	**Action**	**Measures of success**	**Priority**	**Time-frame**
	4.3.2 Work with landholders and land managers to retain high-value bushland areas and to maintain and/ or restore connectivity between remnant vegetation communities through replanting	4.3.2.1 10 % Increase in native vegetation cover connectivity by 2029	M	L
		4.3.2.2 Support the adoption of the land for wildlife program with an annual gain in participation in the municipality		
	4.3.3 Extend and connect native riparian and wetland habitat through removal of weeds and revegetation and stabilisation	4.3.3.1 10 % improvement in the condition of riparian and wetland habitat at priority sites by 2027	M	M
		4.3.3.2 10% decrease in weed coverage on waterways by 2027		
	4.3.4 Work with landholders to promote an understanding of threatened communities and best practice management for native vegetation	4.3.4.1 One (1) annual community awareness activity promoting natural values	M	M
	4.3.5 Work with community and land managers to identify climate refugia areas and work toward ensuring priority areas are protected	4.3.5.1 Climate refugia areas are identified and prioritised by 2027	M	M
4.4 Facilitate improved ecological literacy around biodiversity and sustainable behaviour	4.4.1 Work with private landholders and the community to build understanding around the values of healthy vegetation and biodiversity	4.4.1.1 At least three (3 media items are produced to communicate with the community and landholders about the values of healthy vegetation and biodiversity by 2025	M	S
		4.1.1.2 Review existing brochures and information and update one note sheet per year to be available online		
	4.4.2 Support initiatives that increase knowledge and capacity to actively manage remnant vegetation to retain the ecological values	4.4.2.1 Increased in participation in programs such as the Land for Wildlife Program	M	S
4.5 Increase the condition of high value vegetation	4.5.1 Work with organisations such as the TLC to encourage the retention, protection, and active management of areas with high-value vegetation	4.5.1.1 Increase in high value areas being actively managed for ecological values	M	S

The Friends of Triabunna Reserves step up to clean up – Stephen Bussey

People

People have a key role to play in the sustainable management of Glamorgan Spring Bay's natural assets to ensure the values that form such an important part of the east coast lifestyle are retained into the future.

A recent study indicated that residents of GSB expressed a strong place attachment rating highly an appreciation of the landscape aesthetics, recreational opportunities in the natural habitats, and enjoyment at being able to experience highly diverse natural habitats The study also indicated that access to natural environments was important and restrictions on access were likely to be negatively received, which presents challenges for the management of sensitive areas. An appreciation of isolation in nature is also potentially at odds with the region's economic reliance on tourism which results in increased in visitor numbers in some areas.[57]

Tourism also presents challenges for biosecurity as people move from one area to another potentially moving pests, weeds and diseases on clothing and equipment. Other challenges are ensuring appropriate disposal of litter and the management of waste in areas without adequate public amenities.

The following mechanisms to facilitate natural resource management have been adapted from recommendations made in the Tasmanian Threatened Species Strategy

- Community participation
- Working with landowners, land managers and industry
- Consideration of social and economic factors
- Establishing an adequate knowledge base to understand our natural assets, their condition, threats and how to improve the way we manage them

57 Jayakody 2023

- A recognition of natural values including threatened ecological communities
- An understanding of sustainable land management practices.

Climate change

It is important that residents and businesses stay informed about climate change projections and have personal strategies in place to deal with extreme events, as well as working to adapt home and business premises to minimise climate change impacts such as heatwaves, flood and bushfire.

We can all help reduce carbon emissions, by making homes more energy efficient, recycling and reducing waste, walking or riding a bike instead of taking the car to the shops if they're close by, and car-pooling for longer journeys.

Coastal vulnerability

With the main population centres located on or near the coast, much of our critical infrastructure is located in low lying areas and we need to be prepared as the shape of our coastline and estuarine areas change with climate change and the forecast of an increase in extreme weather events causing storm surges and flooding. Many places where we live and recreate will come under increasing pressure as we continue to share these fragile areas with vulnerable plant and animal communities. The already narrow and often stressed coastal habitat areas will continue to decrease and it is important to consider how we can work together to make sure the natural, recreational and cultural values of these areas are not lost. Hard engineering solutions to protect infrastructure can have unintended impacts by causing erosion to adjacent areas, changing sand and water flows and blocking the natural retreat of coastal saltmarsh and tidal wetland areas.

The Communities and Coastal Hazards Local Area Report Triabunna and Orford[58] identified risks to accessibility between towns and the broader road transport network as extreme and damage to and disrupted use of marina and wharf infrastructure as high. Risk of coastal inundation and erosion damage to natural areas affecting use and loss of land was rated high.

The List https://maps.thelist.tas.gov.au/listmap provides the latest modelling on coastal erosion and inundation hazards.

Bushfires

Bushfires pose a risk to property and the natural environment – inappropriate fire regimes are a key factor threatening vegetation communities and plant and animal species.

Glamorgan Spring Bay is part of the East Coast Fire Management Area (ECFMA). The almost continuous band of dry eucalypt forest stretching across the ECFMA puts the east coast at risk of a major fire impact under serious weather conditions. Dry eucalypt forest types can accumulate approximately two tonnes of fuel per hectare, per year and these fuel loads need to be managed. To date, most fires have been caused by human actions, however lightning strikes combined with an increase in soil dryness associated with climate change are increasingly a cause of unplanned fires.[59] Tourism has seen an increase in visitation and infrastructure in bushfire prone areas. As well as having impacts on vegetation, bushfires in iconic wilderness areas could also have longer term impacts on the local economy.

Smoke from bushfires can also affect air quality, posing health risks.

The management of bushfire related risk is not the sole responsibility of any one land manager or agency. It is a shared responsibility of the whole community.

58 AECOM 2016
59 SFMC 2021

A tenure blind approach to bushfire risk mitigation planning creates opportunities for collaboration between public and private land managers and owners and promotes the development of a centrally coordinated bushfire risk mitigation program.[60]

As the risk of bushfires increases it is more important than ever to have a plan and seek advice and assistance to ensure appropriate fire management strategies are in place and that impacts on natural values are considered.

Photo – Alan Morgan

It is important to be mindful of your impacts on the environment and on other users. Take the time to get to know the natural values in your area and how you can modify your behaviour to reduce your impacts.

Sharing our space

Many of our favourite recreational activities such as fishing, boating, walking the dog, cycling and surfing, require us to share the environment with shorebirds, fragile plants and dynamic shorelines

Take only photos, leave only footprints!.

Help to create a sustainable balance between human use and the natural environment, keep to formal tracks and pathways, follow directions on signage, and fishing, hunting and water regulations to minimise impacts.

The coastal foreshore not only provides habitat but is an important buffer between you and the sea. Plants provide shelter from salt ladened winds, their roots help hold the sand and soil together to reduce wind and water erosion, they are all part of ecosystems that rely on a delicate balance between the different components– small actions can have big impacts.

Dumping of garden waste, collecting firewood, and clearing public reserves for views and pathways degrade these natural areas, leaving them vulnerable to wind and wave erosion and negatively impacting important habitat.

Collaboration and sharing of knowledge, experience and resources

It is clear that sustainable natural resource management requires land holders and managers, on private and public land to work together and move toward cross tenure landscape solutions. The community of GSB has a depth of knowledge and experience that can be shared and built upon. This strategy has been the initiative of the Glamorgan Spring Bay Council, however its successful implementation will require cooperation by community, businesses, and all levels of government. Working together we can resource natural resource management in Glamorgan Spring Bay and beyond.

Orford Community Group show that many hands make light work. Volunteers play a huge role in looking after our natural areas. Photo - GBSC

60 SFMC 2016

Orford School students , community & land managers working together are a great example cooperative natural resource management. Photo – Jane Wing

How you can get involved

- ✓ Get involved in the implementation of this plan – provide feedback on issues that affect you
- ✓ Become a member of the East Coast Catchments Steering Committee
- ✓ Adopt practices that help sustain our natural resources
- ✓ Volunteer to be part of a community group
- ✓ Work with your neighbours to improve your neighbourhood and manage natural resources
- ✓ Find out about weeds and how you can manage them on your property and/or prevent plants escaping from your back yard
- ✓ Apply for a grant to undertake works that enhance our natural assets
- ✓ Provide a letter of support for funding applications
- ✓ Join programs such as the Land for Wildlife or Gardens for Wildlife or join a Landcare group and contribute to the conservation of local plants and animals.

A communication and engagement plan and a comprehensive list of stakeholders was developed to guide community consultation and participation in development of the draft NRM strategy. These will also guide the review and finalisation of the strategy.

Working together to manage our natural resources

5. PEOPLE				
OBJECTIVE : Incorporate regional community wellbeing into agricultural and natural area management programs to improve resilience				
Goal	**Action**	**Measures of success**	**Priority**	**Time-frame**
5.1 Facilitate collaborative Natural Resource Management	5.1.1 Key stakholders are engaged in the implementation of the NRM Strategy	5.1.1.1 - GSBC and key stakeholders commit to working together to implement the NRM strategy by 2024	H	S
		5.1.1.2 - GSBC and key stakeholders commit funds annually to facilitate partnerships, support community involvement and coordinate the implementation of priority activities in the strategy		
	5.1.2 Identify and consolidate existing and new data to inform NRM projects and projects	5.1.2.1 - Investigate options for an central repository for GSB data that is accessible to the public for current and future projects	M	M
		5.1.2.2 - Current and new NRM data and information is regularly uploaded and available online with an annual increase in information available online to community and stakeholders		
	5.1.3 Integrate NRM activities across council	5.1.3.1 - Ensure regular communication between NRM staff, works crews and relevant council staff	M	S
	5.1.4 Develop simple cross tenure foreshore management plans for community action based on GSBC Reserve Flora and fauna plans	5.1.4.1 - One foreshore management plan developed each year	M	M
		5.1.4.2 - Foreshore plan priority actions implemented annually		
	5.1.5 Investigate training and pathways for participation in land management and conservation	5.1.5.1 - A program in place that links employment agencies and training providers to on ground NRM action by 2024	M	S
		5.1.5.2 - At least 2 people have gained work experience with an organisation undertaking on-ground NRM activities by 2025		
	5.1.6 Work with community and stakeholders to develop interpretive and wayfinding signage to promote NRM themes such as biodiversity.	5.1.6.1 - Needs analysis completed and key sites and themes identified by 2026	M	M

Table 8 Action table for working together ***Priority H- High, M-Medium, L-Low.***
Timeframes: S - Short 1-2 years; M- Medium 3-5; L – Long 5+ years

5. PEOPLE (Continued)				
OBJECTIVE : Incorporate regional community wellbeing into agricultural and natural area management programs to improve resilience				
Goal	**Action**	**Measures of success**	**Priority**	**Time-frame**
5.2 Improve community understanding and preparedness for climate change - Glamorgan Spring Bay is a leader in building climate change resilience	5.2.1 Utilise existing and new NRM data to develop priorities for climate adaptation	5.2.1.1 - Priorities for climate adaptation identified by 2025	H	M
	5.2.2 Increase community awareness of climate change and adaptation strategies	5.2.2.1 - Program to help people assess climate change risks and adaptation strategies by 2026	H	M
		5.2.2.2 - Four information and knowledge building sessions by 2025		
	5.2.3 Increase bushfire management planning incorporating natural values	5.2.3.1 - Work with SES, TFS & fire ecologists to deliver fire resilience planning workshops that incorporate natural values, 2 workshops by 2025	H	M
5.3 Facilitate increased community participation in and awareness of NRM	5.3.1 Continue to support the community engagement plan for NRM to ensure community ownership of the NRM strategy	5.3.1.1 - Actions in the community engagement plan implemented by 2024	H	S
	5.3.2 Provide opportunities for community to get involved in NRM	5.3.2.1 - Community members invited and participate in advisory groups such as the East Coast Catchments Steering committee	H	S
		5.3.2.2 - Community members invited and encouraged to contribute to projects and initiatives such as the University of Tasmania's natural values mapping		
		5.3.2.3 - Regular articles in local newsletters and newspapers		
		5.3.2.4 - Information about how to get involved on GSBC and stakeholders websites		
	5.3.3 Facilitate educational and awareness raising activities for schools	5.3.3.1 - Two (2) activities each year	H	S

5. PEOPLE (Continued)				
OBJECTIVE : Incorporate regional community wellbeing into agricultural and natural area management programs to improve resilience				
Goal	**Action**	**Measures of success**	**Priority**	**Time-frame**
	5.3.4 Work with key organisations such as Landcare Tasmania, Wildcare, NRM South, Landscape Recovery Foundation, Birds Tasmania and Clean Up Australia to support community groups undertaking NRM activities	5.3.4.1 - An annual collaborative event with key organisations	H	S
	5.3.5 Support community involvement in NRM (land, bush, coast and water care) activities including weed management	5.3.5.1 - Community groups and non-government organisations participate in weed management working bees. At least 3 working bees annually.	H	S
		5.3.5.2 - 10 % Increase in community interest and participation in community group activities by 2025		
	5.3.6 Promote Aboriginal history through cultural activities, storytelling and interpretive signage as appropriate	5.3.6.1 - Cultural activities incorporated into two (2) community NRM events	M	S
	5.3.7 Connect communities with paths and walkways to promote walking and bike riding in local areas	5.3.7.1 - Investigate opportunities for increasing connectivity between communities, amenities and natural areas by 2027	M	L
	5.3.8 Work with different stakeholders groups to promote outdoor activities that connect the community with each other and the natural environment, and promote health and well being	5.3.8.1 - Increase in number of different groups holding activities and events that celebrate the natural environment and health and wellbeing	H	S
	5.3.9 Work with the tourism industry (Tourism Tasmania, East Coast Tourism Tourism Tasmanian Industry Council and local operators to raise awareness of the natural values of the east coast and how to reduce visitor impacts	5.3.9.1 - Key focus areas, audiences and communication methods identified by 2025	H	S
	5.3.10 Retain significant trees across the landscape particularly in urban and peri-urban areas	5.3.10.1 - Develop a significant tree register by 2026	M	S

Getting things **done**

Priorities for action

Priorities for actions are set out in the goals and action tables under each theme. Actions are prioritised as H- High, M, Medium, L, Low, using the following criteria – consistency with the GSBC Strategic Plan, timeframe for implementation, resources required, level of complexity, whether they were new, existing or follow up projects, potential to have a postive impact, community support, opportunities to leverage support and resourcing.

Timeframes are relative to the five year duration of this document S - Short 1-2 years; M- Medium 3-5 years; and L – Long 5+ years.

To support their implementation these actions will be pulled out into more detailed action plan tables with a breakdown of tasks, responsibilities, timeframes and resourcing requirements, and used to drive stakeholder collaboration and commitment. An annual work plan for cooperation will be developed and progress monitored.

Adaptive management

Progress against the actions and measures of success will be reported annually. Following the principles of action learning, the progress will be evaluated, challenges and successes recognised, and the tasks and actions adapted to incorporate new learnings to achieve the objective of the plan. This will also enable the plan to adapt as new modelling and information about climate change becomes available.

A number of other actions were identified and are included in Appendix D. These actions are considered to be beyond the capacity of this initial document. This does not mean they are not important, rather they require further collaboration, resourcing and/or require longer-term commitment. Appendix D should be reviewed, and actions adopted as information, resourcing and commitment allows.

Context for delivering NRM in Glamorgan Spring Bay

The Landscape Recovery Foundation
This document has been prepared for Glamorgan Spring Bay Council by the Landscape Recovery Foundation.

The Landscape Recovery Foundation (LRF) is a not-for-profit organisation set up with the aim of protecting and restoring Tasmanian biodiversity and ecological processes on a landscape scale. The Foundation has been established by a group of experienced and passionate environmental practitioners with a wealth of experience in ecological systems, threatened species management and community engagement. You can find out more about the LRF by visiting our website.

NRM in Tasmania

Across Australia there are 54 regional natural resource management organisations whose role is to bring stakeholders together to work toward protecting and sustainably managing natural resources in each region. In Tasmania we have three NRM regions governed the Tasmanian Natural Resource Management Act 2002 (NRM Act) and the Tasmanian Government's NRM Framework. Glamorgan Spring Bay falls within the southern NRM region with NRM South as our peak NRM organisation. NRM South leverage investment from both the Tasmanian and Australian Governments to implement the NRM South Strategy toward 2030. A document that assists NRM South plan, develop and deliver on-ground actions across southern Tasmania. NRM South is the Australian Government's service provider for the southern Tasmanian NRM Management Unit and is responsible for implementing the Australian Government's Regional Land Partnerships Program and ensuring projects contribute to the following long-term outcomes.

1. The ecological character of Ramsar sites is maintained or improved.
2. The trajectory of species targeted under the Threatened Species Strategy, and other EPBC Act priority species, is improved.
3. The natural heritage Outstanding Universal Value of World Heritage properties is maintained or improved.
4. The condition of EPBC Act listed Threatened Ecological Communities is improved.
5. The condition of soil, biodiversity and vegetation are improved.
6. Agriculture systems have adapted to significant changes in climate and market demands.

Glamorgan Spring Bay's NRM Strategy aligns with the NRM South Strategy toward 2030 by developing targeted actions that work to conserve threatened species, biodiversity and support agricultural best practice. It operationalises the management of key assets and guides how to best work with the local community to deliver NRM outcomes.

Council's Roles

Council's Role	Definition	Example activities	Example NRM activities
Provider	The services and facilities council is directly responsible for delivering to community.	Waste management, parks and open space, recreation facilities, infrastructure, transport (roads), active transport	Management of natural areas, open space and paths, tracks and trails.
Regulator	The process and rules council administers to ensure compliance to legislation, regulations and bylaws that keep the community safe and liveable	Regulation and approval, animal management, planning and zoning, building and plumbing permits and environmental health	Planning requirements around land use, natural values, bush-fire risk, weed management
Facilitator	Council encouraging or making easy action or engagement	Encouraging investment and employment in the areas, access and inclusion, community participation, climate action (including sustainable energy use and renewables) arts and culture, collaborations, relationships and partnerships.	Facilitating participation by stakeholders, community groups and individuals in understanding and caring for our natural resources. Facilitating partnerships between landholders and land managers to enable cooperation and collaboration across tenure. E.g. cross tenure weed control, restoration of natural areas
Advocate	Council promoting or recommending actions to others on behalf of the Municipality.	Political representation, affordable housing, education opportunities and outcomes, transport (roads, walking cycling) health and wellbeing services, lobbying on behalf of community on State and Federal matters	Advocate for resourcing and collaboration to further the management of natural resources. Includes weed management and other biosecurity issues, water quality and use, protection of natural values and biodiversity, land use and sustainable agriculture

Table 1 – Council's roles and influence

Gaps

In the development of this strategy we have looked at number of key documents. However, much work has been done in the Glamorgan Spring Bay area and it is acknowledged that time has not permitted a comprehensive assessment of all the data and/or documents that have been developed for the region. To set targets so we can measure the impacts of our management actions it is important to have a good understanding of existing and new data. An ongoing action will be to continue to identify and consolidate new and existing data and identify gaps.

Legislation & Policies

State

Aboriginal Heritage Act 1975

Biosecurity Act 2019

Climate Change (State Action) Act 2008

Climate Change (Greenhouse Gas Emissions) Regulations 2022

Coastal and Other Waters (Application of State Laws) Act 1982

Crown Lands Act 1976

Environmental Management and Pollution Control Act 1994

Environmental Management and Pollution Control (Waste Management) Regulations 2020

Forest Practices Act 1985

Inland Fisheries Act 1995

Land Use Planning and Approvals Act 1993

Living Marine Resources Act 1995

Local Government Act 1993

Marine Farming Planning Act 1995

National Parks & Reserves Management Act 2002

Natural Resource Management Act 2002

Nature Conservation Act 2002

State Policy on the Protection of Agricultural land 2009

State Coastal Policy 1996

State Policy on Water Quality Management 1997

Tasmanian Threatened Species Protection Act (TTSP) 1995

Tasmanian Water Management Act 1999

Tasmanian Vegetation Fire Management Policy 2017

Waste and Resource Recovery Act 2022

Whales Protection Act 1988

Commonwealth

Environment Protection and Biodiversity Conservation Act (EPBC) 1999.

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Abbreviations and Acronyms

ABS- Australian Bureau of Statistics

EPBC -Commonwealth Environment Protection and Biodiversity Conservation Act 1999

GSBC – Glamorgan Spring Bay City Council

LGA – Local Government Area

LRF – Landscape Recovery Foundation

NRE- Department Natural Resources & Environment

NRM – Natural Resource Management

NVA – Natural Values Atlas

The LIST – Land Information System Tasmania

TASVEG – The Digital Vegetation Map of Tasmania

TTPS -Tasmanian Threatened Species Protection Act 1995

WSUD – Water Sensitive Urban Design

Glossary

Acid sulphate soils - Acid sulphate soils contain iron sulphides and are found in water-rich environments such as low-lying coastal areas, estuaries, floodplains. When disturbed and exposed to air they can generate sulphuric acid and release elements including heavy metals posing risks to human health and the environment.

Aspect – refers to the direction a block of land faces. In Australia a northerly aspect means the block will get full sun and will generally be hot and dry

Biodiversity - the variety and variability of life on Earth. The greater the number of different species of plants, animals and fungi, the greater the biodiversity.

Dispersive soils – a dispersive soil is a structurally unstable soil– when wet, clay particles separate out and disperse in the water causing the soil structure to collapse. Under certain conditions they can be rapidly eroded and carried away by waterflow.

Ecosystem - A community of plants animals and other organisms working together with their physical environment - the water, rocks, soils, air and climate. In an ecosystem everything depends on everything else in that system, either directly or indirectly, living or non-living. An ecosystem includes all the different interactions and inter-relationships occurring in a space – the space can be big like an ocean or tiny like a crevice in a rock. The earth is made up of many interconnecting and inter lapping ecosystems.

Endemic – a native plant or animal restricted to a certain place – a plant endemic to Tasmania is only found in Tasmania.

Groundwater - water located below the ground in underground water pockets, or reservoirs called aquifers. Groundwater is one of our most valuable resources. About 30% of all the readily available freshwater in the world is ground water.

Hydrology – the study of the properties, movement and distribution of water on and below the earth's surface and in the atmosphere. It includes understanding the water cycle and the impact of human activity on water availability and quality and potentially impacting wildlife and humans.

Maritime - coastal or seaside - influenced by being close to the sea.

Microplastics – tiny plastic particles, under 5mm in size and as small as 0.06 mm, form when plastic degrades when it is exposed to sunlight and wave action. These microplastics contaminate the marine ecosystem, entering into the food chain and impacting wildlife and humans consuming shellfish and fish.

Pan evaporation – measure of the amount of water that evaporates from an open pan over a period of time – this measure is important for water management and irrigation.

Ramsar - wetlands recognized as 'Wetlands of International Importance' by the Ramsar Convention, which is an agreement to promote the conservation and sustainable use of wetlands worldwide. The treaty was signed in Ramsar, Iran, in 1971.

Reference condition – the condition of a reference site located in a pristine or minimally-disturbed catchment. A comparison with the reference condition is used to assess condition and levels of impact of test sites.

Refugia – climate change refugia are relatively stable areas that are less likely to be impacted by climate change events. These areas have the potential to provide habitat for plants, animals and ecosystems to retreat to, survive in and/or expand from as our climate changes.

Riparian – an area located on the bank of a river or stream.

Rehabilitation – restoring degraded areas so that they are healthy and functioning.

Salinity – an accumulation salts in land and water to a level that impacts human and natural values. Salinity affects land and water productivity, threatens natural systems and can damage infrastructure.

Slope – steepness of the ground's surface – the slope of land can limit activities permitted on the land such as vegetation clearance.

Surface water – water that collects on the surface of the ground in a pond, stream, lake or river. Surface water usually collects from rainfall.

Topography – the forms and features of land surfaces such as mountains, valleys and plains, rivers and cliffs.

Transmissible (cancer) – (cancer) spread by direct contact – in the Tasmanian Devil the cancer tumour cells are spread between devils by direct contact – that is the cancerous cells are directly transferred from one devil to another by the exchange of bodily tissues containing cancerous cells. This usually happens when the animals are fighting over food.

Appendices and supporting documents

Appendix A (separate cover) - Communication & Engagement Plan

Appendix B (separate cover) - Relevant sections from Glamorgan Spring Bay Council's Strategic Plan

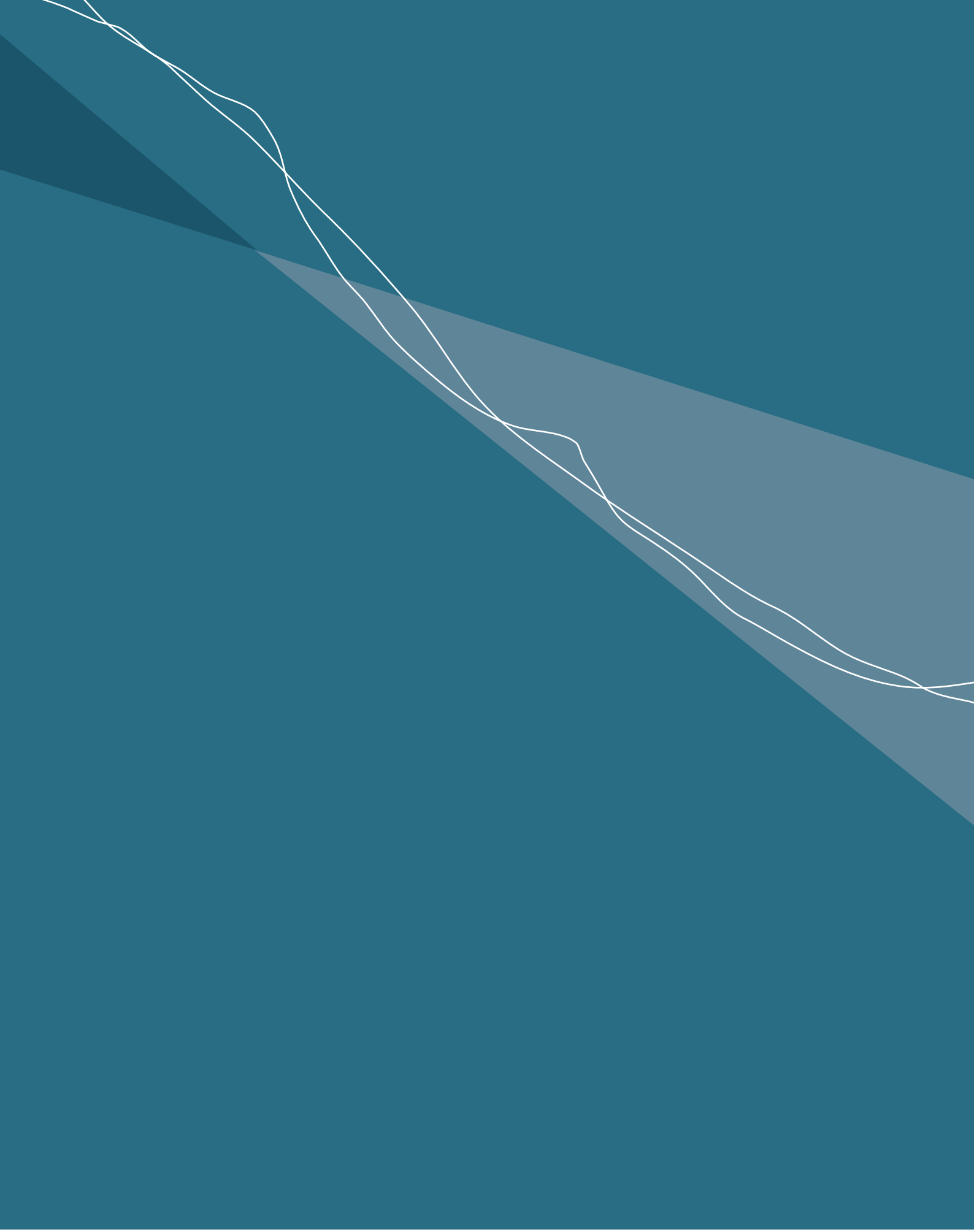
Appendix C (separate cover) - Natural Values – plant communities and threatened species found in Glamorgan Spring Bay

Appendix D (below) - Other important management actions for consideration and/or follow-up

Theme	Goal	Action
Water	Improve wastewater and sewage treatment capacity	
	Impacts on our water ecosystems are reduced	In-stream dams and barriers are designed to facilitate natural migration.
		Install fish ladders at key sites identified in the prioritisation plan (2.4.7)
Land	Significant geoheritage sites are conserved	
Biodiversity	Maintain and/or improve the condition of native vegetation and habitats for flora and fauna	Develop guidelines for visitor groups such as snorkelers, kayakers and divers for Marine Reserves and other areas and how to protect and conserve natural marine values
		Restrict fishing in high value estuarine areas as per recommendations in the Edgar report
		Advocate for establishment of buffer zones for vegetation communities and habitat areas as climate change refugia
People		

Appendix D Other management actions for consideration and/or follow up

Photo - Alan Morgan



GLAMORGAN SPRING BAY COUNCIL

LANDSCAPE RECOVERY FOUNDATION