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To whom it may concern:

Thank you for the opportunity to review and provide input on the *draft Biodiversity Bill 2025 (SA)*.

I broadly support the majority of the 39 topics identified in the public consultation survey for the draft Bill. However, while the current draft acknowledges fungi and algae, they belong to distinct biological groups with unique ecological, economic, and health implications. Classifying them as plants within the legislation risks leading to ineffective regulations and unintended consequences.

The draft Bill presents an important opportunity to lay the groundwork for South Australia's future research, legislation, and management of fungi and algae as separate entities.

Therefore, I strongly recommend that fungi and algae be distinctly defined and a framework provided for them to be treated separately from plants within the legislation. Below, I outline key scientific, ecological, and legal reasons supporting this recommendation.

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1. Scientific Distinction

Fungi and algae belong to entirely separate biological kingdoms from plants and exhibit fundamental differences in structure, function, and ecological roles.

2. Ecological Importance

Fungi and algae provide essential ecosystem services distinct from those of plants:

- **Fungi** are primary decomposers, facilitating nutrient recycling and soil health, while also forming crucial symbiotic relationships (e.g., mycorrhizal fungi supporting plant growth).
- **Algae** are foundational to aquatic ecosystems, serving as the base of the food web, producing oxygen, and mitigating climate change through carbon sequestration.

3. Legal and Conservation Considerations

Combining fungi and algae with plants may result in inadequate protection and oversight. Their unique threats—such as fungal overharvesting, algal blooms due to pollution, and habitat degradation—require tailored conservation measures. Many international biodiversity frameworks (e.g., the International Union for Conservation of Nature's Red List – IUCN Red List) recognise fungi and algae as distinct groups, reinforcing the need for separate legal treatment.

Classifying fungi as plants in legislation can create several problems, including:

- **3.1 Regulatory Confusion** – Laws governing agriculture, forestry, and conservation often apply differently to plants, fungi and algae. Misclassification could lead to inappropriate



policies, such as applying plant disease regulations to fungi or algae that don't function the same way.

3.2 Conservation Issues – Many fungi and algae are endangered and require specific protection strategies. If treated as plants, they might not receive the necessary legal protections or conservation efforts.

Algae are central to water ecosystems and respond differently to pollutants than plants.

Algae play distinct ecological roles, such as forming harmful algal blooms (HABs) that require specific management strategies.

If treated as plants, conservation efforts may overlook the need for unique protections for certain algae, such as those forming coral reef symbioses.

Laws regulating plant protection (such as herbicide use) could be misapplied, potentially harming aquatic ecosystems.

3.3 Agriculture and Technology – Farming regulations designed for plants (e.g., pesticide use, seed laws) may not be suitable for fungi or algae, leading to ineffective or even harmful policies for industries like mushroom farming or mycorrhizal inoculants.

Algae for example, are used in biofuel production, pharmaceuticals, and food industries, requiring distinct legal frameworks.

If regulated as plants, industries relying on fungi or algae (e.g., spirulina farming) might face unnecessary restrictions or ineffective oversight.

3.4 Intellectual Property and Trade Issues – Patent and trade regulations often distinguish between plant breeding and fungal and algal cultivation. Incorrect classification could create legal loopholes or barriers to fungal or algal biotechnology innovations, creating problems for biotech companies.

Further, international trade agreements covering plant products may not properly address algae-based products.

3.5 Public Health Risks – Some fungi and algae are pathogenic to humans, animals, and plants and produce toxins that affect drinking water and marine life, requiring different risk assessments from plant-related laws. Treating fungi and algae as plants in legislation could lead to ineffective public health and biosecurity measures, increasing the risk of fungal or algal outbreaks.

3.6 Environmental Impact – Fungi and algae play unique ecological roles, such as decomposition and symbiosis with plants. If treated as plants, conservation laws may fail to account for their importance in ecosystems, potentially harming biodiversity.

4. Policy Recommendations

To ensure fungi and algae receive appropriate recognition and protection, I recommend:

- 4.1** Separate interpretations/definitions for fungi, algae, and plants within the Act.
- **Algae** includes algae species of the Protista and Cyanobacteria kingdoms.



- **Fungi** includes any species of the fungi kingdom.
- **Plants** includes any species of the plant kingdom.

If the Minister still wishes to treat fungi and algae as plants, then this could be identified in addition to the interpretation/definition.

4.2 Language to provide space for distinct conservation and management strategies acknowledging the unique ecological roles of fungi and algae.

4.3 Provision for targeted research and monitoring programs of fungi and algae to improve understanding and inform policy decisions.

I have provided national and international case studies where algae and fungi have been included in legislation (see **Attachment 1**).

By clearly distinguishing fungi and algae from plants in this Bill/Act, we will be taking the first steps to establish a more scientifically accurate and effective framework for their future biodiversity protection. This distinction will enable targeted and environmental management, ensuring these vital organisms receive the recognition and safeguards they deserve

I urge the Minister to adopt this approach to support their proper conservation and regulation.

Kind regards

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Attachment 1. Fungi and Algae in Legislation



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Scotland - Legal Recognition of Fungi in Conservation

Scotland has explicitly recognized fungi as an important part of conservation through its biodiversity policies and legal frameworks.

1. Inclusion in National Conservation Policy

Scotland incorporated fungi into its **Scottish Biodiversity Strategy**, acknowledging their ecological importance. This was a major step, as fungi are often overlooked in conservation policies.

2. Legal Protection Under Wildlife Laws

- **Nature Conservation (Scotland) Act 2004:** This law provides protection for species listed as of “principal importance for biodiversity conservation.”
- Certain **fungal species** have been granted protection under schedules of the **Wildlife and Countryside Act 1981**, which was amended to include more non-plant species.

3. Fungal Red List & Threatened Species Protection

The **Scottish Fungi Red List** was developed, identifying species at risk of extinction. Some rare fungi, like **Hericium erinaceus** (Lion’s Mane fungus), are legally protected from collection and destruction.

4. Habitat Protection for Fungi & Algae

Scotland has **protected woodland and peatland habitats** that are crucial for rare fungi and algae. For example:

- **Ancient woodlands** are managed to preserve fungal biodiversity.
- **Peatland restoration projects** protect rare algae species.

5. Integration into Environmental Impact Assessments (EIA)



Developers must consider fungi in Environmental Impact Assessments (EIAs) for projects in ecologically sensitive areas.

6. Research & Monitoring Initiatives

Scotland's **Royal Botanic Garden Edinburgh** and **Fungal Conservation Trust** conduct research on endangered fungi. The government supports citizen science projects for fungal biodiversity monitoring.

Conclusion

Scotland's approach shows how a government can integrate fungi and algae into conservation efforts by:

- Including them in biodiversity laws
- Providing species-specific legal protection
- Protecting key habitats
- Requiring impact assessments for development projects
- Funding research and conservation initiatives

Sweden - Legal Protection of Fungi in Forest Conservation

Sweden has recognized fungi as crucial for biodiversity and forest ecosystems, integrating their protection into national conservation laws and policies.

1. Legal Recognition of Fungi in Conservation Laws

A. Species Protection Under the Environmental Code (Miljöbalken, 1998)

- Sweden's **Environmental Code** provides a legal basis for biodiversity conservation, including fungi.
- Certain fungi are legally protected from collection and habitat destruction.

B. Forest Act (Skogsvårdslagen, 1979)

- Requires forest management to **consider biodiversity**, including fungi.
- Protects old-growth forests, which are essential habitats for rare fungi.
- Encourages sustainable forestry practices to preserve fungal diversity.

C. Species on the Red List (ArtDatabanken – Swedish Species Information Centre)

- Over **500 fungal species** are listed as threatened.
- Sweden follows **IUCN Red List criteria** to assess fungi conservation status.
- Examples of protected species:
 - **Fomitopsis rosea** (a rare wood-decay fungus)
 - **Hydnellum ferrugineum** (a tooth fungus found in old pine forests)



2. Habitat Protection for Fungi

A. Nature Reserves and National Parks

- Sweden has **thousands of nature reserves** where fungal habitats are protected.
- Old-growth forests and wetlands, crucial for fungi, are included in protected areas.
- Example: **Tiveden National Park** protects rare fungi found in ancient forests.

B. Key Habitat Protection (Nyckelbiotoper Program)

- Sweden identifies **key forest habitats** (Nyckelbiotoper) where rare fungi thrive.
- These areas are protected from commercial logging.

C. Deadwood Conservation in Forests

- Many fungi depend on deadwood (fallen trees and decaying logs).
- Forestry regulations **require leaving deadwood** to support fungal biodiversity.
- **Logging bans** in sensitive areas help protect fungal ecosystems.

3. Monitoring & Research Initiatives

- **Swedish Species Information Centre** (ArtDatabanken) monitors fungal populations.
- **Mycological research projects** study the effects of climate change on fungi.
- Citizen science projects encourage public participation in fungal conservation.

4. Fungi in Sustainable Land Management

- Sweden promotes **agroforestry and sustainable forestry** to balance conservation and economic use.
- Mushroom foraging is popular, but regulations prevent overharvesting of rare species.

Conclusion

Sweden's approach shows how a government can protect fungi by:

- Incorporating them into national conservation laws
- Creating reserves and habitat protections
- Regulating forestry to preserve fungal biodiversity
- Monitoring and researching fungal populations
- Encouraging sustainable land management

New Zealand - Legal Protection of Algae in Marine Conservation

New Zealand has taken significant steps to recognize and protect algae, especially in marine environments, through legislation and conservation efforts.

1. Legal Protection Under Marine and Biodiversity Laws



A. Marine Reserves Act 1971

- This law allows for the creation of **marine reserves**, where marine life, including algae, is protected.
- Algal habitats in marine reserves like the **Poor Knights Islands Marine Reserve** are safeguarded from human disturbances such as harvesting, pollution, and coastal development.

B. Resource Management Act (RMA) 1991

- Governs the sustainable use of natural resources, including marine ecosystems.
- Requires Environmental Impact Assessments (EIAs) for activities that may harm algal biodiversity, such as coastal construction or pollution.
- Protects important algae-rich ecosystems like **kelp forests** and **seagrass beds**.

C. Exclusive Economic Zone (EEZ) and Continental Shelf (Environmental Effects) Act 2012

- Regulates deep-sea activities that may impact algae in offshore ecosystems.
- Protects **deep-sea coralline algae**, which provide habitats for marine life.

2. Recognition of Algae as Key to Ecosystem Health

New Zealand acknowledges algae's role in:

- Carbon sequestration (absorbing CO₂)
- Providing habitat for fish and invertebrates
- Maintaining water quality

This recognition has influenced conservation planning, leading to protections for **kelp forests** and **macroalgae beds**.

3. Specific Algal Conservation Initiatives

A. Kelp Forest Protection

- **Giant kelp (Macrocystis pyrifera)** is a priority for conservation.
- **Overfishing of sea urchin predators** has led to kelp decline (urchins overgraze kelp forests).
- Marine protected areas limit fishing to maintain balanced ecosystems.

B. Protection of Endangered Algal Species

Some rare algae, such as **Phyllospora comosa**, are monitored and protected in marine reserves.

C. Māori Customary Protection

- **Māori iwi (tribes)** have traditional marine management areas (**Mātaitai Reserves**), where algae are sustainably harvested and protected based on indigenous knowledge.



- Algae like **karengo (Porphyra spp.)**, a seaweed used as food, are managed through customary rights and conservation practices.

4. Research & Monitoring Programs

- The **National Institute of Water and Atmospheric Research (NIWA)** studies algal biodiversity and climate change impacts.
- Citizen science projects help monitor algal health along the coasts.

Conclusion

New Zealand's approach demonstrates how governments can recognize and protect algae by:

- Including them in marine conservation laws
- Establishing marine reserves and protected areas
- Regulating human activities that impact algal ecosystems
- Incorporating indigenous knowledge into conservation
- Funding research and monitoring programs

Australia - Legal Protection of Marine Algae

Australia has recognized the ecological and economic importance of marine algae, incorporating their protection into marine conservation laws and environmental policies.

1. Legal Protection of Marine Algae

A. Environment Protection and Biodiversity Conservation Act (EPBC Act, 1999)

- The **EPBC Act** is Australia's key environmental law, protecting species and ecosystems, including marine algae.
- Certain algae species are protected if they are classified as **threatened** under the Act.
- Example: **Neptune's Necklace (*Hormosira banksii*)**, a key intertidal algae, is protected in marine reserves.

B. Great Barrier Reef Marine Park Act (1975)

- The **Great Barrier Reef Marine Park** is one of the world's largest protected marine ecosystems.
- Critical **macroalgae habitats** (like kelp forests and seagrass beds) are preserved to maintain biodiversity.

C. State & Territory Laws for Coastal Protection

- **Victoria's Flora and Fauna Guarantee Act (1988)**: Protects threatened marine algae.
- **Western Australia's Biodiversity Conservation Act (2016)**: Regulates human impacts on marine ecosystems.

2. Habitat Protection for Algae



A. Marine Protected Areas (MPAs)

- **Over 45% of Australia's waters** are designated as **Marine Protected Areas**, safeguarding algae-rich habitats.
- Example: **Ningaloo Marine Park** protects coral reef and macroalgae ecosystems.

B. Kelp Forest Conservation

- Australia's **giant kelp forests** (*Macrocystis pyrifera*) are declining due to climate change and marine heatwaves.
- The **Tasmanian Kelp Restoration Project** works to regenerate kelp forests.

C. Seagrass and Algal Meadow Protection

- **Seagrass beds** (which support algal communities) are protected under **state marine policies**.
- Example: **Shark Bay, WA**, a UNESCO World Heritage site, protects seagrass and macroalgae.

3. Research & Monitoring Initiatives

- The **Australian Institute of Marine Science (AIMS)** studies climate change impacts on algae.
- The **CSIRO (Commonwealth Scientific and Industrial Research Organisation)** conducts marine algae biodiversity research.
- **Community programs** (e.g., Reef Check Australia) monitor algae health in coastal waters.

4. Regulation of Commercial Harvesting

- Some algae (like **red algae used for agar and carrageenan**) are harvested commercially.
- Sustainable harvesting laws regulate algae collection to prevent overexploitation.
- Example: **Tasmania restricts wild harvesting of certain seaweeds** to protect marine ecosystems.

5. Indigenous Knowledge & Algae Conservation

- **First Nations groups** have traditional uses for marine algae, including food, medicine, and cultural practices.
- Indigenous rangers manage **Sea Country** areas, ensuring sustainable marine resource use.

Conclusion

Australia's approach to marine algae conservation includes:

- Legal protection under national and state laws



- Marine Protected Areas for algal habitats
- Kelp and seagrass conservation efforts
- Scientific research and climate change monitoring
- Regulation of commercial seaweed harvesting
- Integration of Indigenous knowledge in marine management

Canada - Legal Protection of Lichens (Symbiotic Fungi & Algae)

Lichens, which are symbiotic associations between fungi and algae (or cyanobacteria), are vital for biodiversity, air quality, and forest ecosystems. Canada has taken steps to protect rare and endangered lichen species through legislation and conservation initiatives.

1. Legal Protection of Lichens

A. Species at Risk Act (SARA, 2002)

- Canada's **Species at Risk Act (SARA)** provides legal protection for endangered and threatened lichens.
- Examples of protected lichens:
 - **Boreal Felt Lichen (*Erioderma pedicellatum*)** (Endangered)
 - **Blue Felt Lichen (*Degelia plumbea*)** (Threatened)
 - **Ghost Antler Lichen (*Pseudevernia cladonia*)** (Vulnerable)

B. Provincial Conservation Laws

Some provinces have additional protections:

- **Nova Scotia:** Protects Boreal Felt Lichen under provincial endangered species laws.
- **British Columbia:** Includes lichens in **old-growth forest protection policies**.
- **Quebec:** Regulates air pollution, benefiting lichens, which are sensitive to air quality.

2. Habitat Protection for Lichens

A. Old-Growth Forest Protection

- Many rare lichens depend on ancient forests with stable, humid conditions.
- **Logging restrictions** in protected areas help conserve lichen-rich ecosystems.
- Example: **Boreal Felt Lichen is found in protected forests of Newfoundland and Nova Scotia.**

B. Air Quality Regulations

- Lichens are **bioindicators of air pollution**, especially sensitive to sulfur dioxide.
- Canada has **strict air pollution controls**, helping lichen populations recover in some areas.



C. National and Provincial Parks

- Many parks protect **lichen-rich habitats**, including:
 - **Gros Morne National Park (Newfoundland)**
 - **Pacific Rim National Park Reserve (British Columbia)**

3. Research & Monitoring Initiatives

- The **Committee on the Status of Endangered Wildlife in Canada (COSEWIC)** assesses lichen conservation status.
- Universities and environmental groups conduct lichen **population monitoring**.
- **Citizen science projects** encourage hikers and naturalists to report rare lichen sightings.

4. Indigenous Knowledge & Lichen Conservation

- **Indigenous communities** recognize lichens for their medicinal, ecological, and cultural importance.
- Collaborative conservation projects integrate **traditional knowledge** with scientific research.

5. Sustainable Land Use Policies

- Forestry companies must **follow guidelines** to protect lichens in managed forests.
- Some areas **restrict industrial development** near critical lichen habitats.

Conclusion

Canada's approach to lichen conservation highlights:

- Legal protection through SARA and provincial laws
 - Habitat conservation in old-growth forests and parks
 - Air quality regulations benefiting lichens
 - Research, monitoring, and citizen science
 - Integration of Indigenous knowledge in conservation
-