

An aerial photograph of a desert coastline. The top half of the image shows a vast, arid landscape with intricate patterns of sand and rock in shades of tan and brown. A small, isolated green oasis is visible on the left side of the coast. The bottom half of the image shows the deep blue waters of the ocean, meeting the land at a dark, rocky shoreline.

°CelsiusPro

Life and business must continue.

With climate change.

Parametric Insurance a key to sustainability in the **Blue Economy**



You learn a lot being in the risk transfer market for 40 years

Jonathan Barratt

Parametric/Index Based insurance is used in the Agricultural markets to build resilience against catastrophic events and events that affect yield.

There is no reason that this insurance cannot be used to help industries involved in the **Blue Economy**.

With your help, industry-appropriate insurance can be **streamlined to make sense**.

Why do we exist?

We aim to ensure life and business worldwide continue. With climate change.

What is our mission?

We aim to elevate parametrics from fringe to centre stage in climate risk protection.

Where there's Climate Data there's a CelsiusPro solution

Using extensive **knowledge, experience and state of the art environmental monitoring software**, CelsiusPro is a full service provider offering:

Software Solutions

- Insurance Scheme Management
- Environmental Monitoring

Index Products

- Structuring and Pricing
- Settlement Agent

Consulting

- Risk Analysis and Product design
- Technical Assistance and Education

“

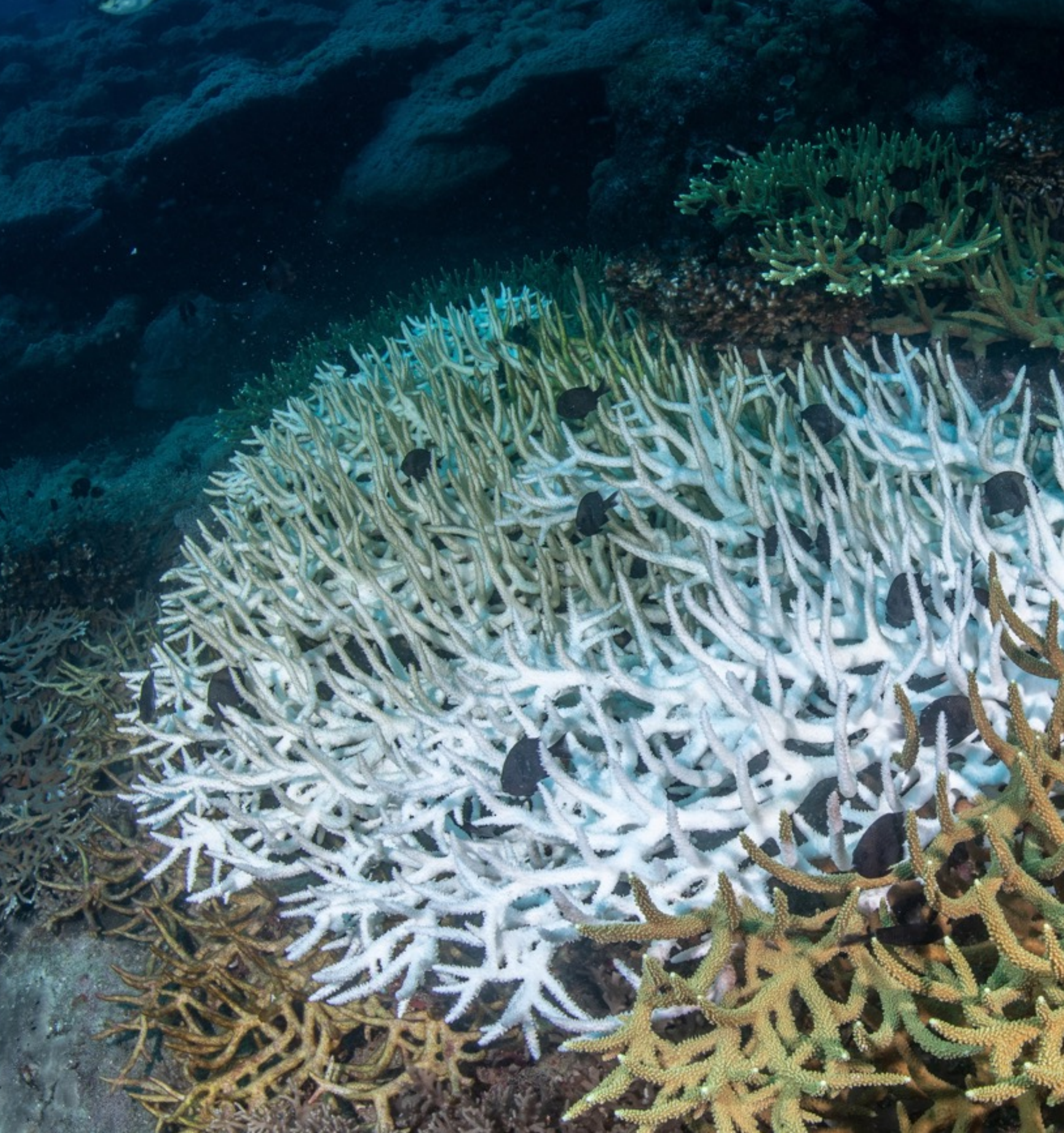
We have seen devastating impacts of marine heatwaves on our kelp forests, seagrass meadows and coral reefs, and this **has affected the ecological, economic and cultural benefits Australian's derive from the oceans**

These extreme events are having a **profound effect on us a marine nation.**

”

Professor Thomas
Wernberg






Marine heatwaves have already caused **mass deaths of key species along 45 percent of Australia's coastline.**

Australia's giant kelp forests have declined by **more than 90 percent due to ocean warming.**

The incidence of marine heatwaves has doubled since the 1980s.



You already know the effects Marine Heat Waves (MHW) and cyclones have on the Blue Economy

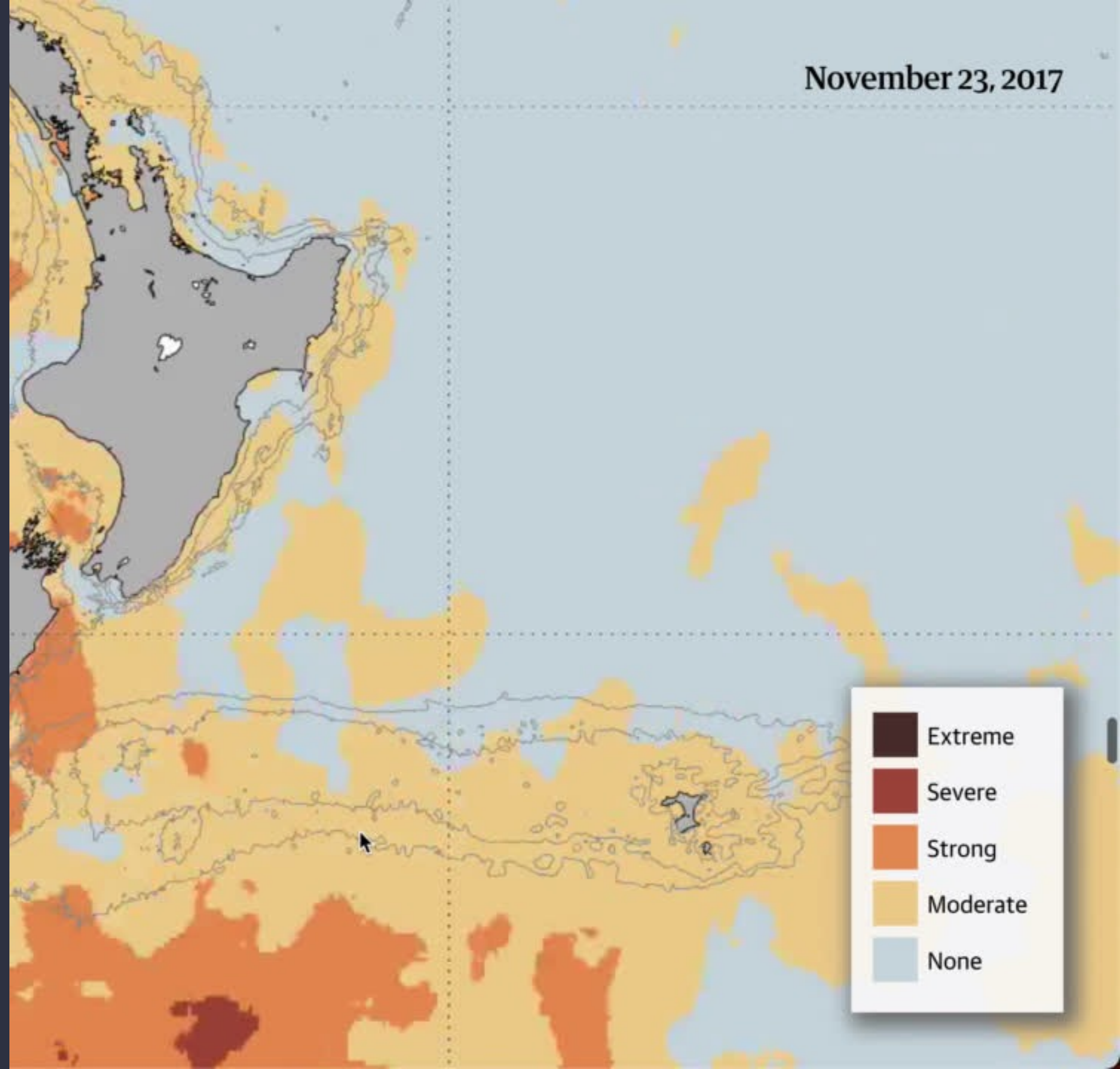
We need your support to find solutions.

November 23, 2017

Whilst the long-term ecological impacts are a complex problem to solve,

We see a solution to the economic impacts that affect small and large businesses using

Parametric Insurance



An aerial photograph of a coastline. The top right corner shows a sandy beach with some vegetation. The rest of the image is dominated by a dark blue sea. The text is overlaid on the sea.

Insurance Works
Insurtech Enables

Parametric Insurance

There are two types of insurance we use in primary production:

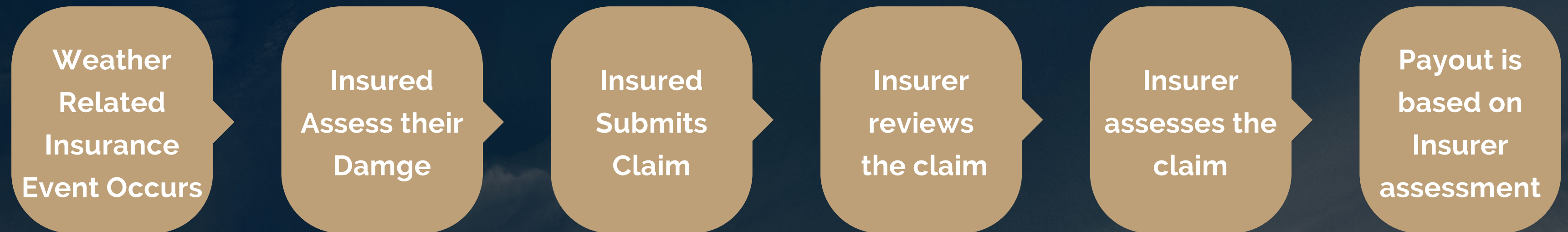
- **Indemnity policies:** These take the form of traditional insurance covers such as fire, storm and tempest, hail, etc.
- **Non-indemnity policies:** such as parametric index insurance which covers events that cause the losses rather than insuring the value of the asset. The insurance is based on the expected loss of an event occurring that causes the damage.

What is Parametric Insurance?

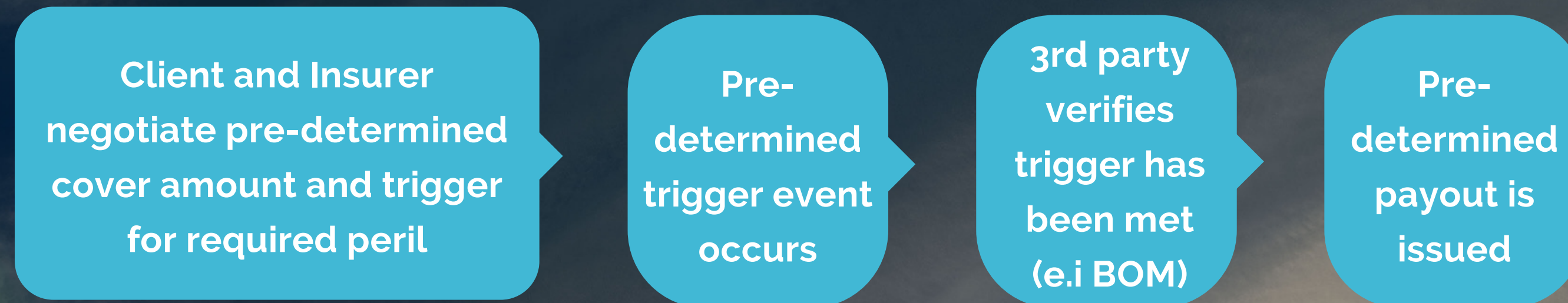
Parametric Insurance is **bound by predetermined parameters** (triggers and thresholds), all agreed up-front when the policy is purchased. If the parameters are met, the policy is triggered, and a payout is made. **Claims are processed quickly**, which means businesses **have income in the immediate aftermath** of an event to meet the challenges of re-establishing their income flow after an adverse weather event.

What are parametric or index based risk management products?

Indemnity insurance settlement process (the old way)



Parametric Insurance Settlement Process (the new way)



An aerial photograph of a coastline. The top left corner shows a sandy beach with some vegetation. The rest of the image is dominated by dark, rippling water. The text is centered over the water.

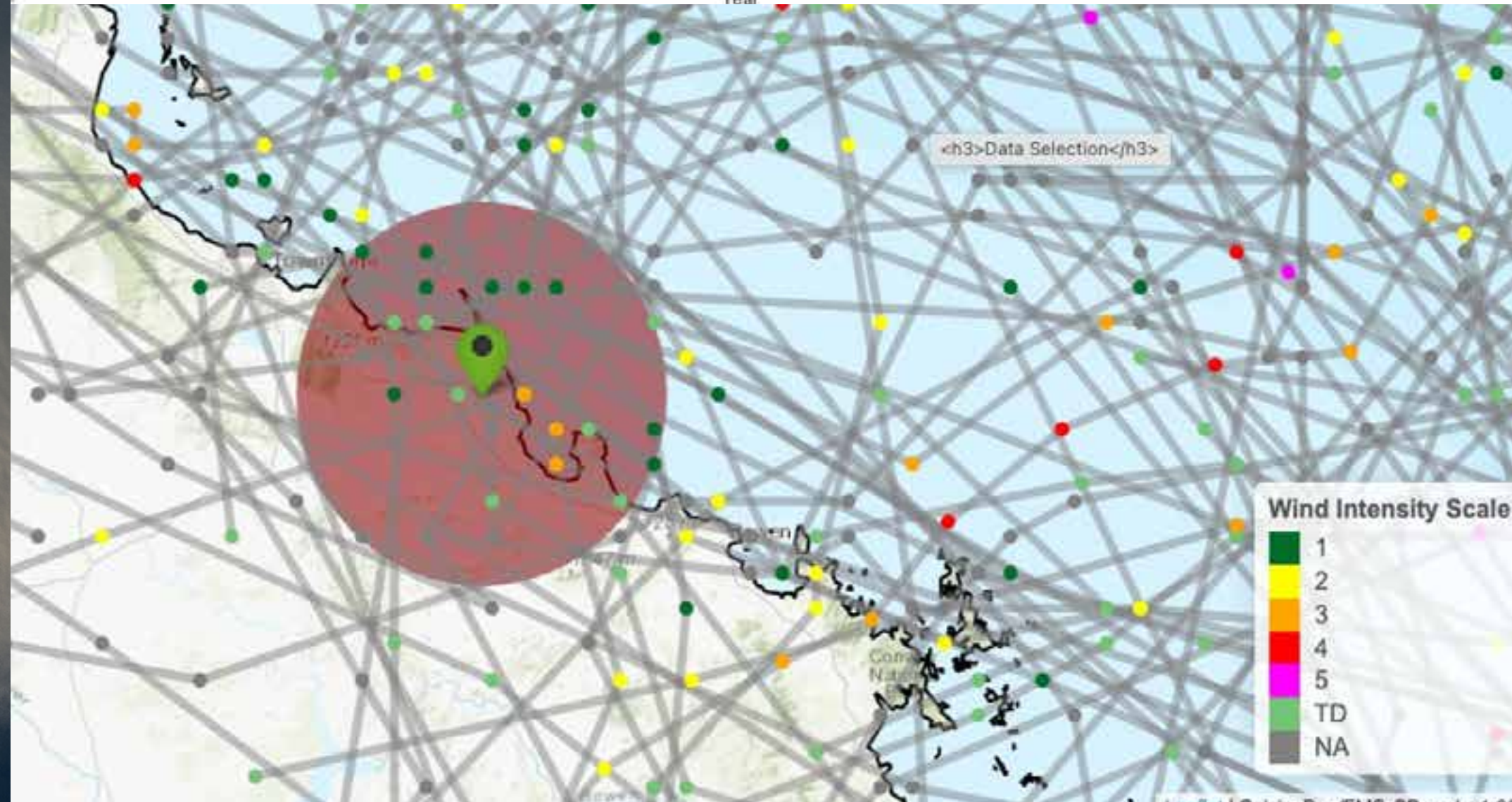
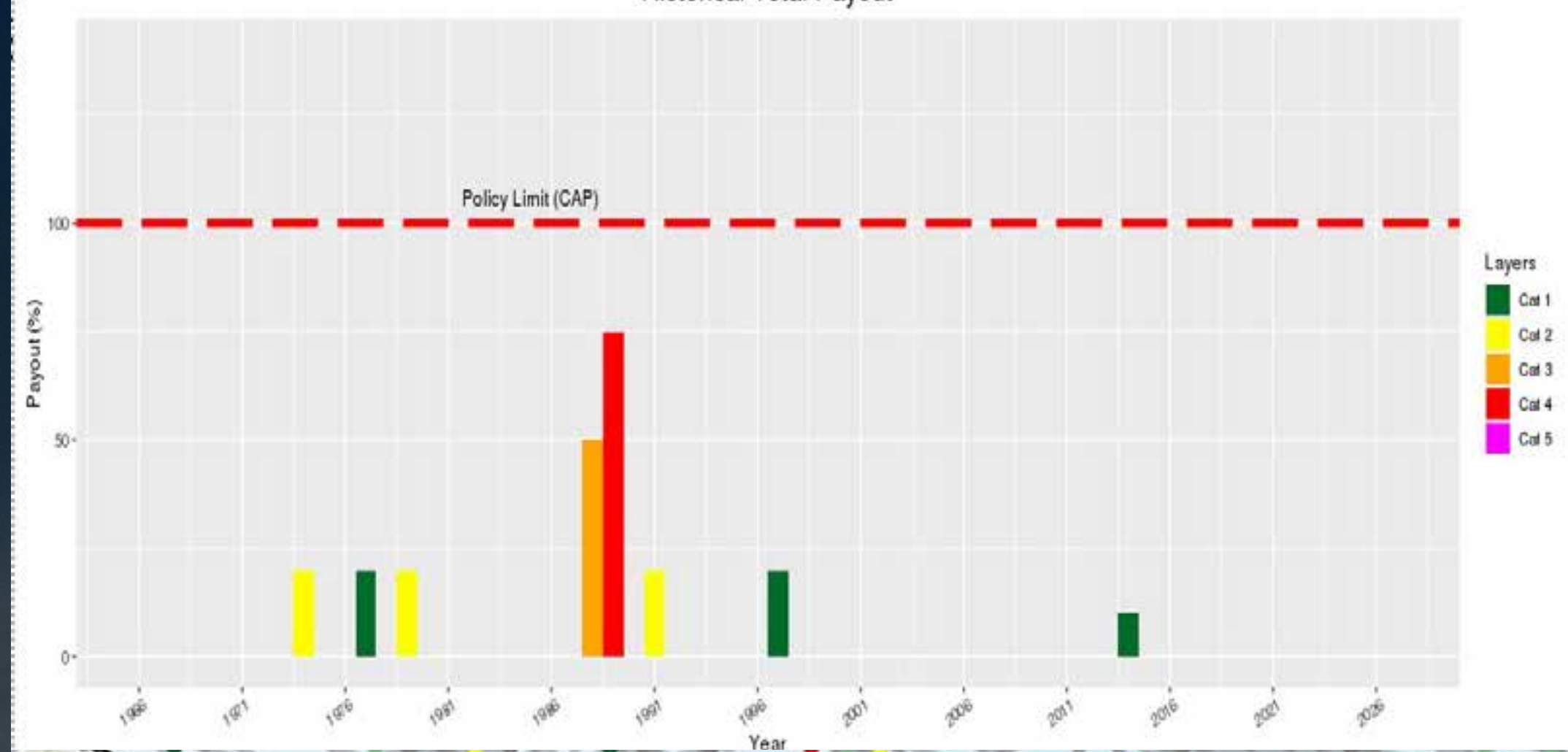
**Here are a few
Examples**

Example: Cyclone

Location: Burdekin Shire Qld
Risk Period: 1st Nov for 12 months
Structure: CAT in A Circle within 60km radius of the farm
Sum Insured: \$100,000
Premium: 5% or \$5,000

Event Payout Table for 60km Circle

Cyclone Category	From (km/h)	To (km/h)	Payout (% of sum insured)
CAT 1	63	89	10%
CAT 2	89	118	20%
CAT 3	118	160	50%
CAT 4	160	200	75%
CAT 5	200	300	100%



Example: Excess Rain

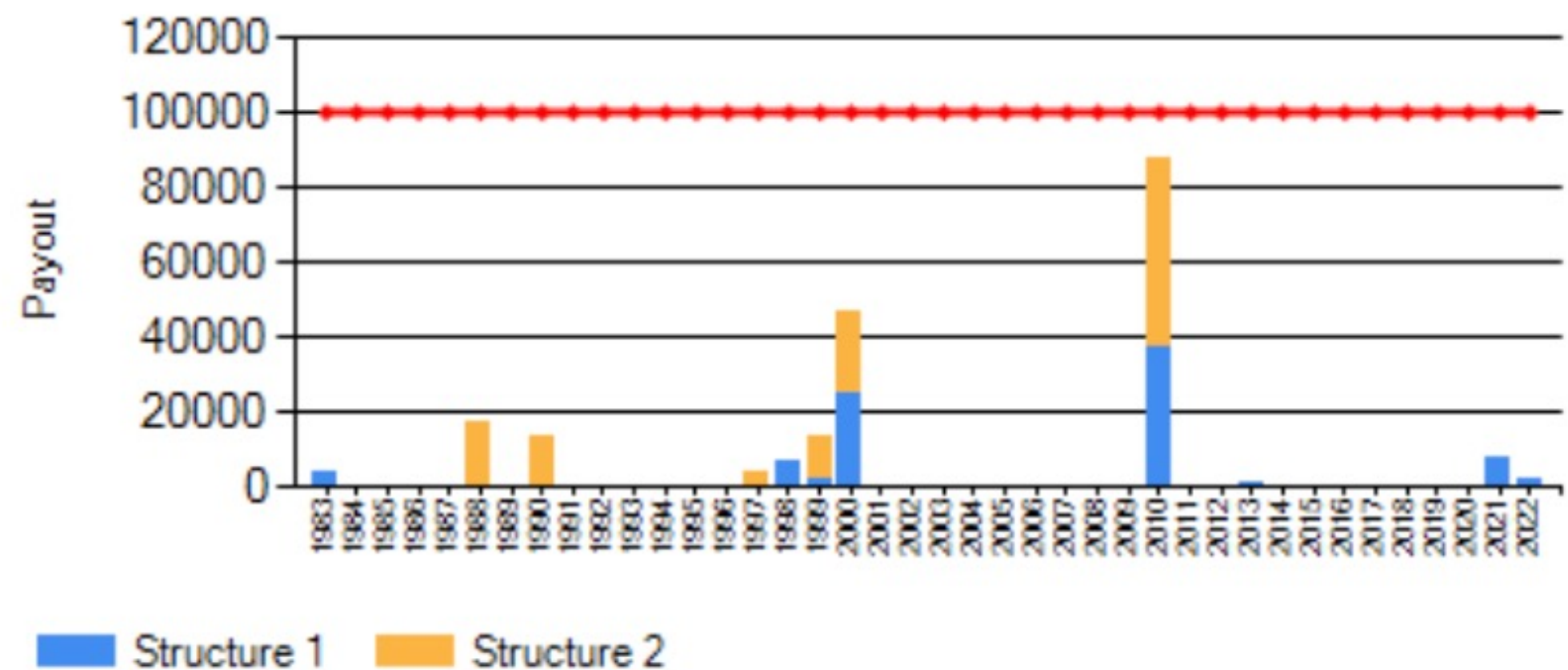
Location: Burdekin Shire Qld
Risk Period: November - December
Structure: Decile 8 -Rain Season Multicover
Sum Insured: \$100,000
Premium: 9.2% or \$9'203

Description

- Structure one pays **\$223 per mm greater than 76mms** over November to a max payout of **\$50'000**.
- Structure two pays **\$111 per mm greater than 203mms** over November and December to a max payout of **\$50'000**.



Payout History



The image is a composite of two underwater photographs. The top half shows a healthy coral reef with vibrant, colorful corals and many small fish swimming in clear blue water. The bottom half shows a coral reef that has been bleached, appearing as a flat, white and yellowish surface with very few fish. A dark semi-transparent box is overlaid on the left side of the image, containing white text.

Parametric Insurance like this,
can be used in the **blue economy**

An aerial photograph of a coastline. The top right corner shows a sandy beach with some vegetation. The ocean is a deep blue, with white-capped waves breaking along the shore. The sky is a pale, hazy blue.

If your industry is affected by:

- **Cyclones**
- **Water Temperature (Marine Heat Waves)**
- **Air Temperature,**
- **Wind Droughts**
- **Rainfall**

Industry can be covered by Parametric Insurance

The 5 Essential Ingredients

In order to provide a good parametric Insurance product we require the following:

1. **Historical and Daily independent Data that is recognised globally (BOM)**
2. **Engagement from the Industry to research willingness to buy (structure and affordability)**
3. **Engagement from underwriters to gauge willingness to provide**
4. **Insurtech software to structure and settle policies**
5. **Good Educational process**

Example Structure: CDD Tmax Water Temperature

A CDD Tmax structure adds the degrees measured above a daily threshold. It pays a predetermined amount for every cumulative degree.

This structure can be tailored to **any business affected by extreme ocean temperatures and Marine Heat Waves.**

MHW - CDD Tmax Call Example

Threshold C°:	18°
Strike:	0
Payout per °	\$150,000
Sum Insured	\$300,000

	Temp C°	Count°
Day 1	16.0	0
Day 2	18.1	0.1
Day 3	18.2	0.2
Day 4	18.3	0.3
Day 5	18.1	0.1
Day 6	17.9	0
Day 7	17.9	0
Day 8	18.1	0.1
Day 9	18.2	0.2
Day 10	17.9	0
Sum > 18°		1.0

So CDD° count	1.0
Less Strike	0
Total CDD	1.0

Payout: \$150,000

If you change the strike to 1 from 0 then \$0 is the payout.

If you only had one day of >18.10° then the payout is 0.1 x \$150,000 = \$15,000

So if on one day you get -1.6° the payout is 1.6 x \$350,000 = \$187,500

CDD Tmax Case Study: Salmon Farms

Tasmanian Salmon Industry

The Tasmanian Salmon industry represents one of Australia's most valuable seafood industries.

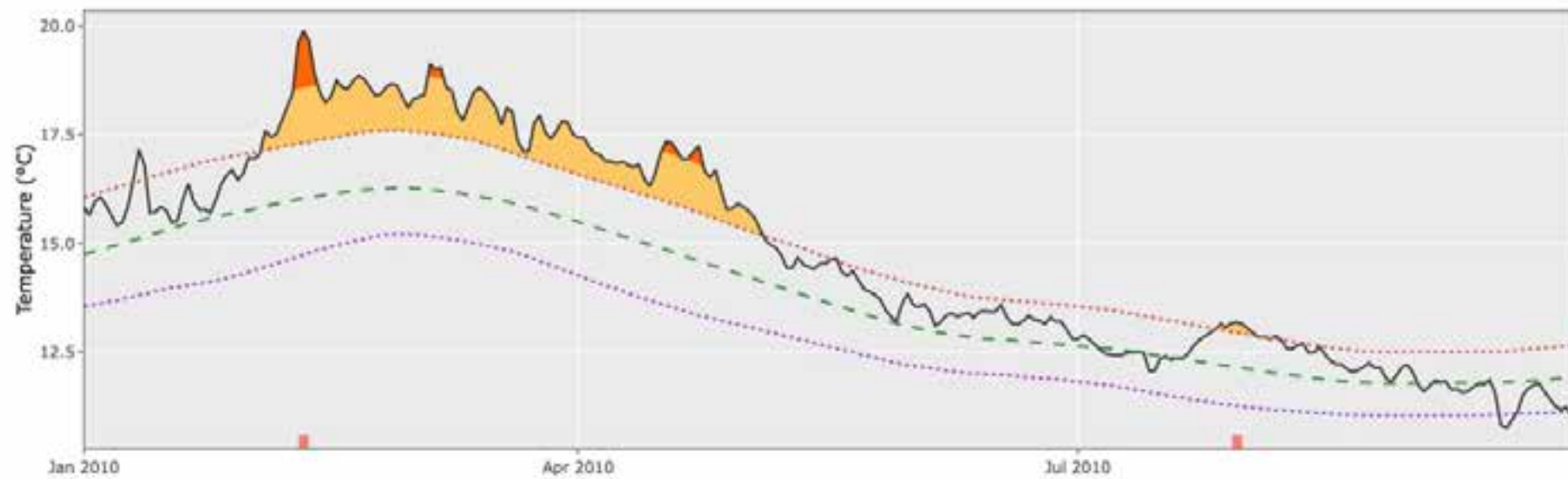
Average temperatures in this region are projected to be **2.8 °C higher than the 1990–2000 average by 2050**

Thermal tolerances are predicted to be exceeded more frequently, which could **lead to degraded fish health, increased disease outbreaks and mortality.**

The salmon industry is considered vulnerable because salmon are currently grown in coastal waters that in some years **exceed a thermal limit of about 18 °C.**

We can design a structure to combat lost income due to these Marine Heat Waves.

CDD Tmax Case Study: Salmon Farm

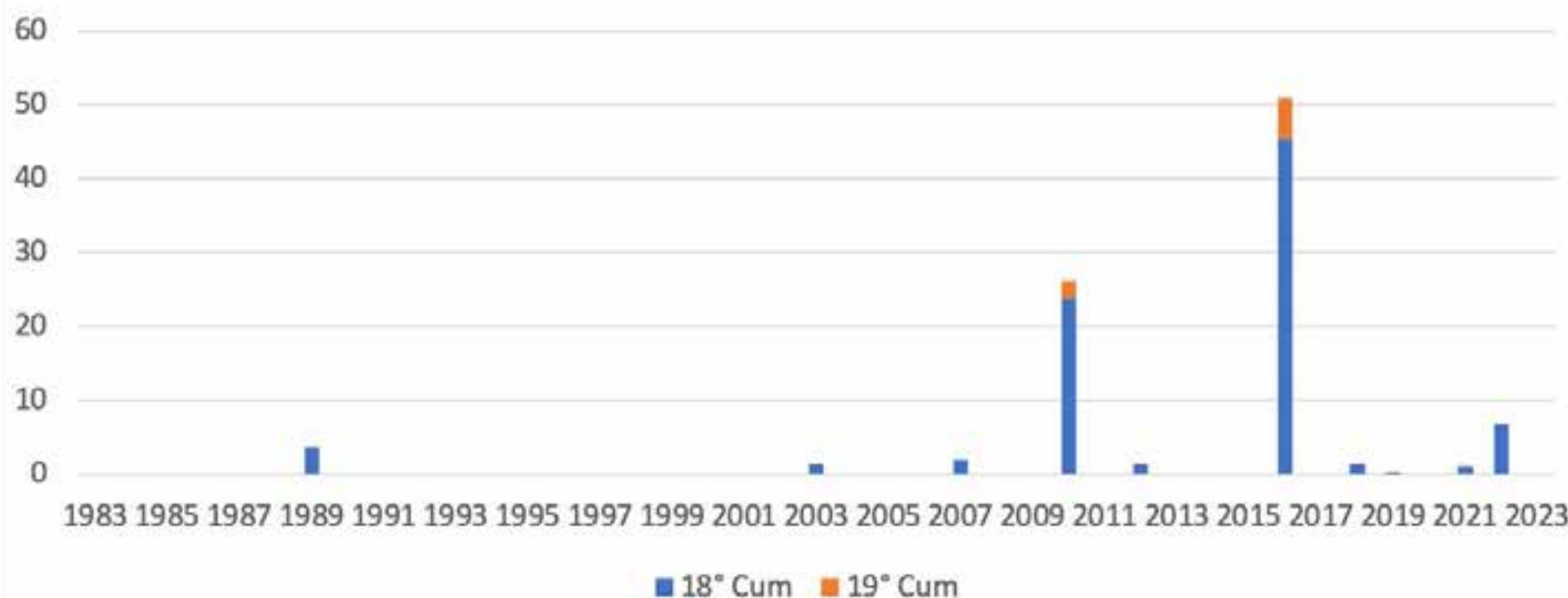


2010 Marine Heat Wave for grid 147.625, -43.125



2016 Marine Heat Wave for grid 147.625, -43.125

Raw Burn - Grid 147.625 -43.125 (°)



This Tasmanian Salmon Farm reported **significant mortality rates** and **decreased quality of produce** during these Marine Heat Waves. Resulting in loss of income.

This CDD Tmax Cover would have recovered some of these losses

CDD Tmax Case Study: Salmon Farm

Tasmanian Salmon Farm: -43.125 147.625,



Parameters

Structure 1	
Risk period:	Jan - Mar
Cover:	CDD Tmax
Threshold	18°
Strike:	0
CDD	\$5,000
Cover length:	30°
Sum Insured	\$150,000

Structure 2	
Risk period:	Jan - Mar
Cover:	CDD Tmax
Threshold	19°
Strike:	0
CDD	\$10,000
Cover length:	15°
Sum Insured	\$150,000

Premium

7.15%

CDD Tmax Case Study: Oyster Farms

NSW Oyster Industry

The Oyster industry represents one of Australia's most valuable seafood industries. In particular the Sydney Rock Oyster.

Average air temperatures are projected to be extreme especially as we head into an El Nino climate phase.

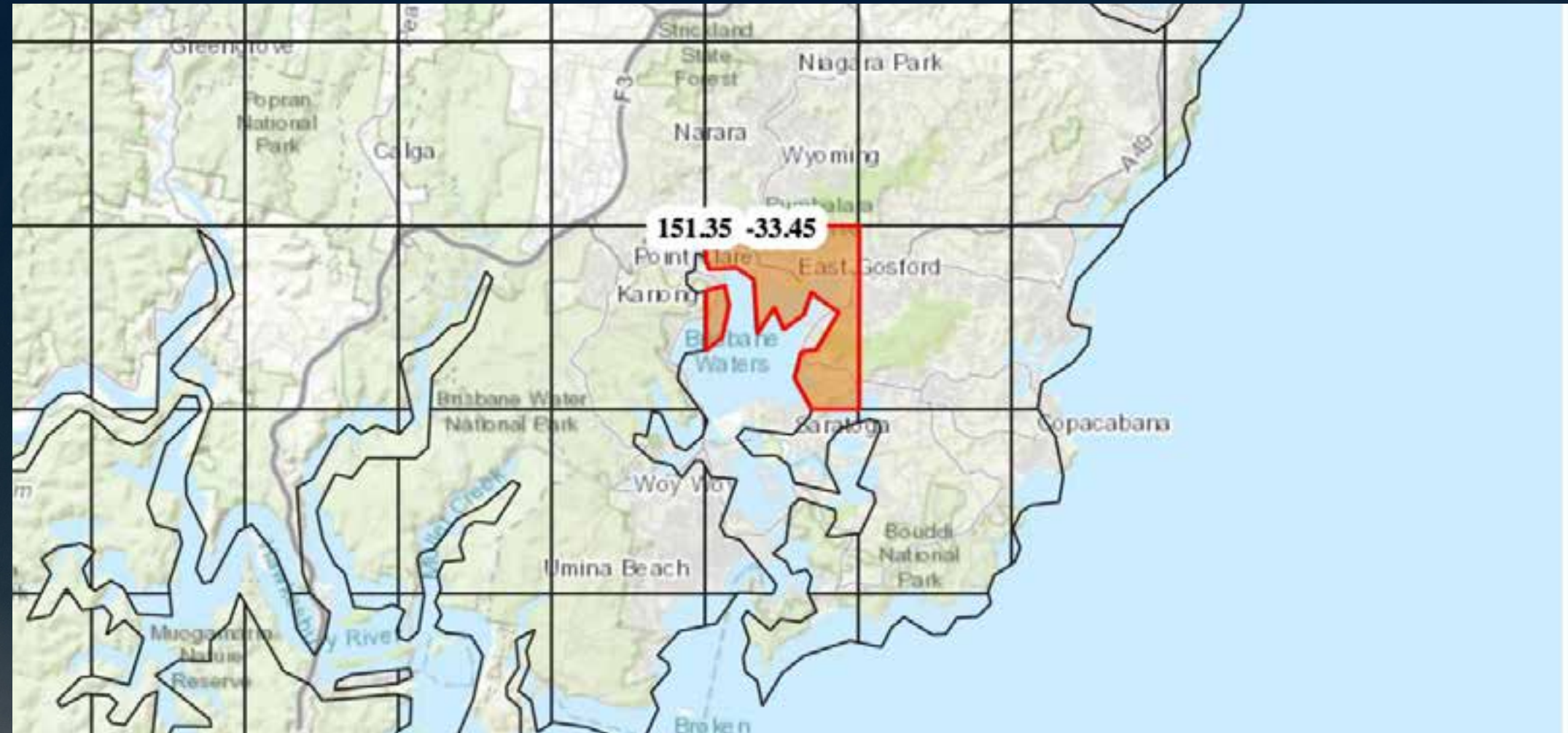
Oysters are exposed for longer periods during king tides, and some of these tides occur in summer. This can **lead to degraded health of the shell fish, and increased mortality.**

The oyster industry is considered vulnerable if the air temperature exceeds **38°C whilst at low tide.**

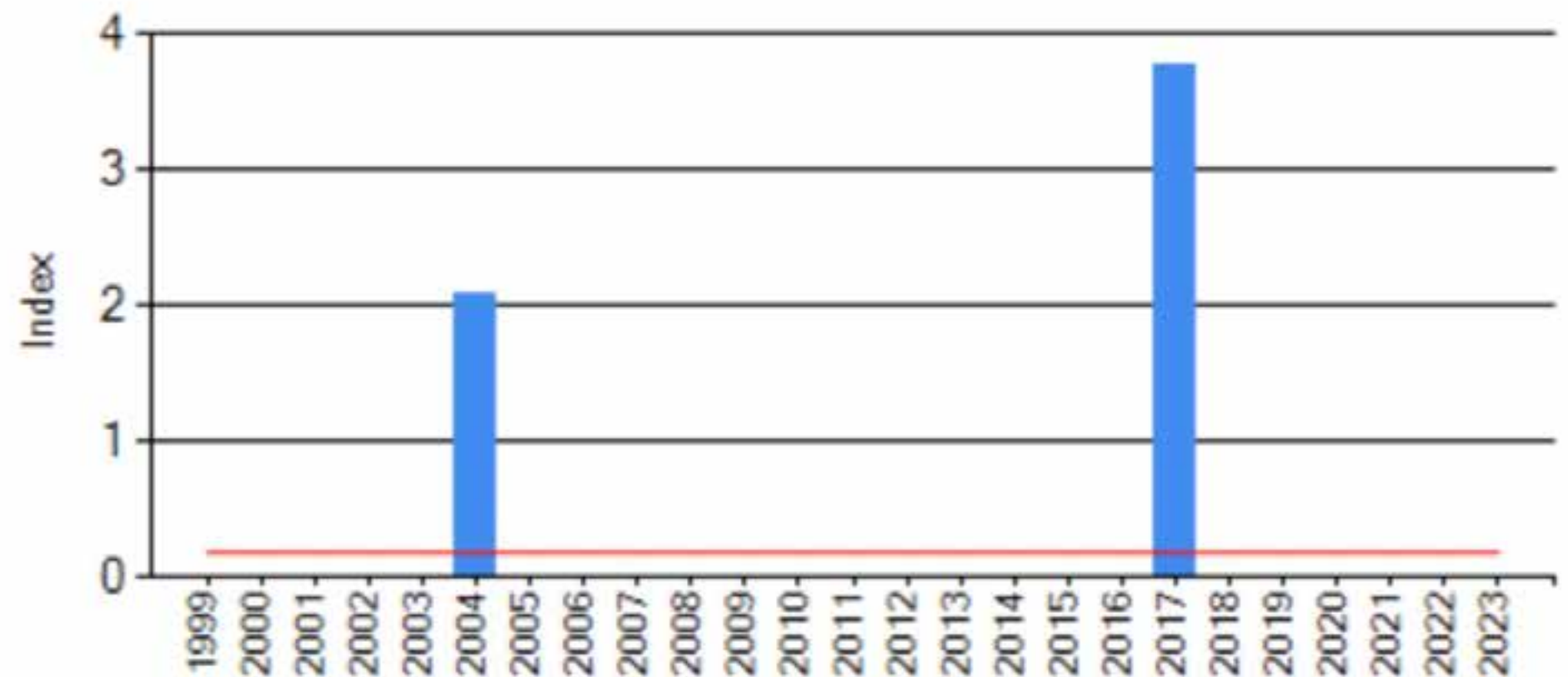
We can design a structure to combat lost income due to these Heat Days.

Example Structure: CDD Tmax Air Temperature

A CDD Tmax Structure pays a predetermined amount each day the air temperature exceeds a threshold. It continues to pay the hotter it gets.



Historical Index



CDD Tmax Case Study: Oyster Farms

This is an example of a term sheet of a cover for a NSW oyster farm.

Premium: 9.2%

2. Certificate Description

Under this Certificate, the Client will receive a fixed amount of **AUD 25'000** for each Critical Day after the **0** of such days up to a maximum of **AUD 150'000** during the period from **08.02.2024** until **15.02.2024**. For the purpose of this Term Sheet, a Critical Day is defined as a day on which the Daily Maximum Temperature measured by the independent national meteorological station **38 °C**.

3. Final Terms and Conditions

Certificate Number:	692525
Issuer:	CelsiusPro (Australia) Pty Ltd (ABN 14 157 765 618) (CelsiusPro Australia), Lumley House, Level 14, 309 Kent Street Sydney NSW 2000, AFSL nos. 498585
Name of Certificate:	CDD TMax Certificate
Strategy:	Call
Client:	
Premium Amount:	AUD 15'717
Date of Issue:	28.11.2023
Payment Date:	21.01.2024
Start Date:	08.02.2024
End Date:	15.02.2024
Calculation Period:	The period from and including the 08.02.2024 to and including the 15.02.2024
Underlying:	Daily Maximum Temperature
Threshold:	38 °C
Critical Day:	Daily Maximum Temperature 38 °C
Payout per Critical Day:	AUD 25'000
Index:	Sum of Critical Days during Calculation Period
Strike:	0 Critical Day(s)
Maximum Payout Amount:	AUD 150'000

Testing the Efficiency of the Insurance

To examine the utility of an indexed-based insurance option that could help to financially protect clients, we **measure the efficiency of the insurance, through these 5 tests:**

a)

An economic assessment was made by taking the Average of heatwave Income - (Average of heatwave Income - Premium + Payouts) if the result was less than 0 the insurance was economical

b)

A Premium verses Payout Assessment over 40 yrs .
Premiums Paid - Payouts Received > 0 then insurance is economical

c)

Assessment of the volatility of marine income through measuring the standard deviation on incomes

d)

Measurement of whether insurance will increase client's revenue in years during extreme heatwave conditions via a Conditional Tail Expectations (CTE) approach

e)

Assessment of the extent to which a contract reduces downside risk (i.e. does insurance minimise the loss in poor years) via a Mean Root Square Loss (MRSL) approach

Making it worthwhile

In order to make an insurance policy worthwhile all stakeholders need to be involved and collaborate to insure the best possible outcome:

- 1. We need to make sure the Data is Reliable**
- 2. Continuous Research and Development**
- 3. Activate and engage Industry Participants**
- 4. InsurTech to deliver Price Discovery and Settlement**
- 5. Engage Reinsurance Providers**

Conclusions

CelsiusPro and the University of Southern Queensland are actively looking for collaboration in research and development to **build resilience to adverse weather events that affect marine industries.**

In addition, there are **opportunities for funding research** into the use of parametric insurance in industries that receive ODA funding.

Accolades and Acheivments

2009

Winner of the Swiss Insurance innovation award

2017

Finalist of the Australian Insurance Industry Awards (Innovation of the Year)

2021

Listed in Fintech Global's INSURTECH top 100 most Innovative InsurTech Companies

2014

Winner of the Australian Insurance Industry Awards (Innovation of the Year)

2018

Top10 InsurTech Companies in Europe 2018 by Insurance CIO Outlook magazine

Get in Touch and Begin your Journey with **°CelsiusPro**

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