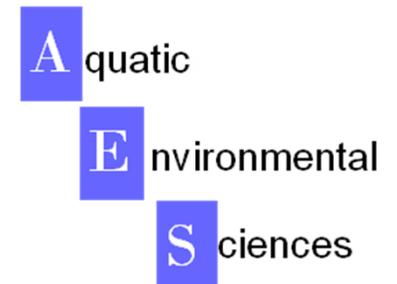


# Overall assessment of potential effects of iron sand recover off the Taranaki Coast

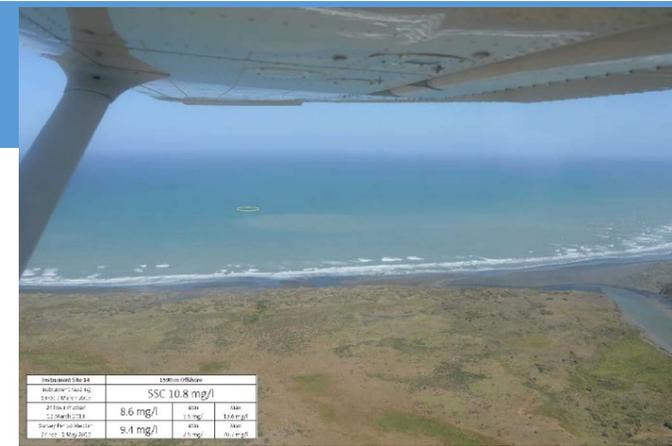
Dr Mark James, Aquatic Environmental Sciences Ltd



- 1. Overall assessment of effects of Iron Sand Recovery on environment off Taranaki Coast**
- 2. Context spatially and temporally for effects**
- 3. Comments on monitoring, triggers and compliance**

# South Taranaki Bight

- **High energy, dynamic environment**
- **Influenced by:**
  - **Strong wave activity**
  - **Sediment inputs from rivers**
  - **Alongshore currents, tidal and wind-driven currents**
  - **Upwelling and advection (nutrients, organic matter)**
- **Ecological values**
  - **Inshore and nearshore reefs – moderate diversity**
  - **Patea Shoals – mostly worm beds, important to fish and other biota**
  - **Offshore reefs – diverse dog cockle and bryozoan rubble habitats**
  - **Downstream of the Kahurangi plume – high production**
- **Customary, recreational and commercial fishing**



# Risk assessment

- **Main effects with initial assessments of potential risks:**
  - **Effect of direct extraction on benthic animals and habitats (High)**
  - **Effects on benthos in close vicinity (Moderate)**
  - **Impacts on biogenic offshore habitats due to “choking” (Moderate)**
  - **Impacts of biosecurity incursions and oil spills (Moderate)**
  - **Reduced light – primary production of phytoplankton and benthic algae (Moderate – high)**

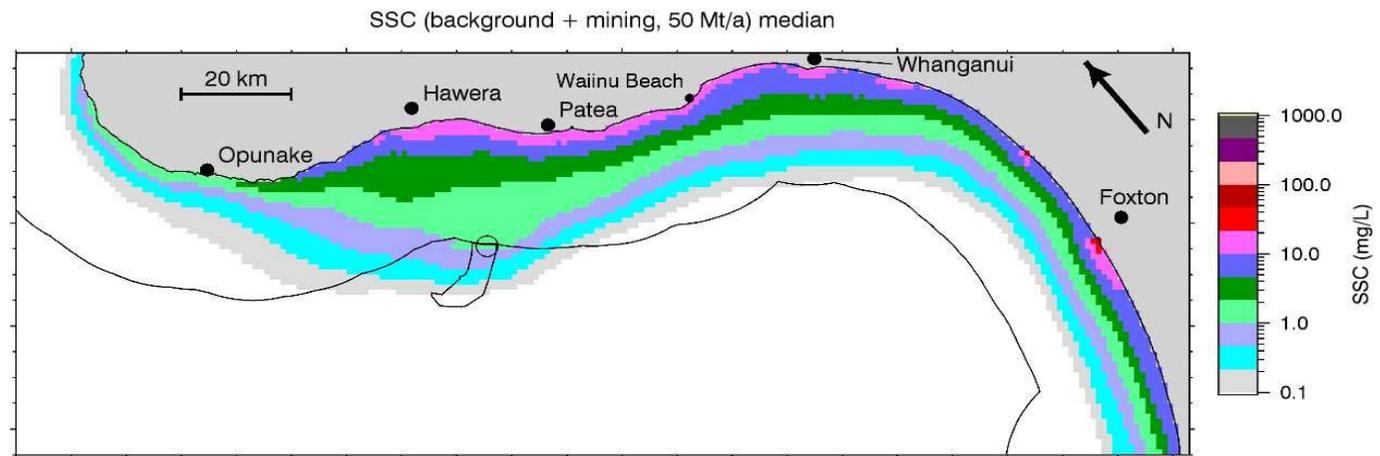
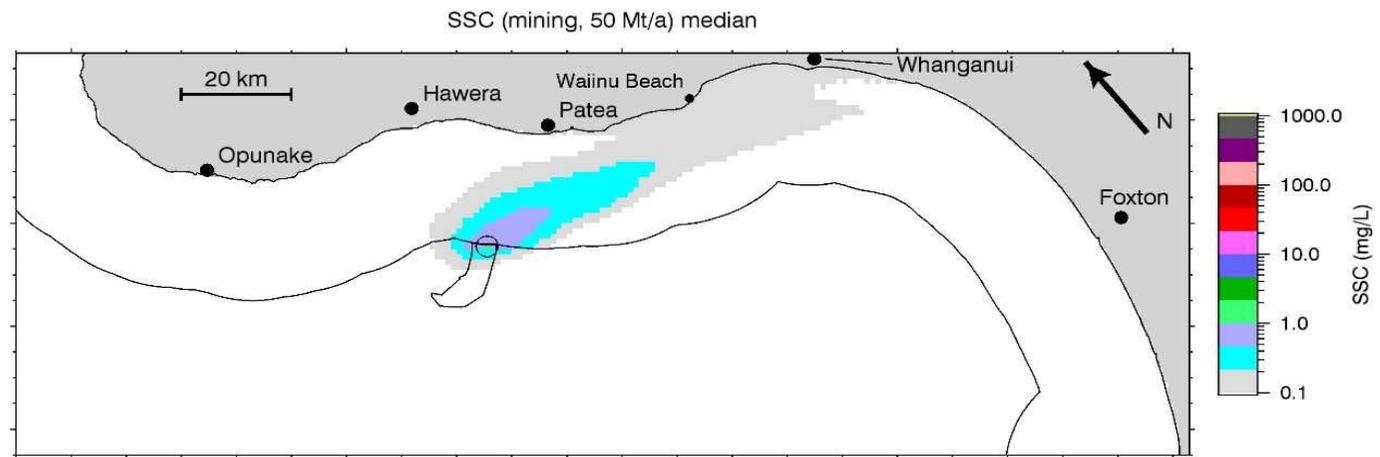
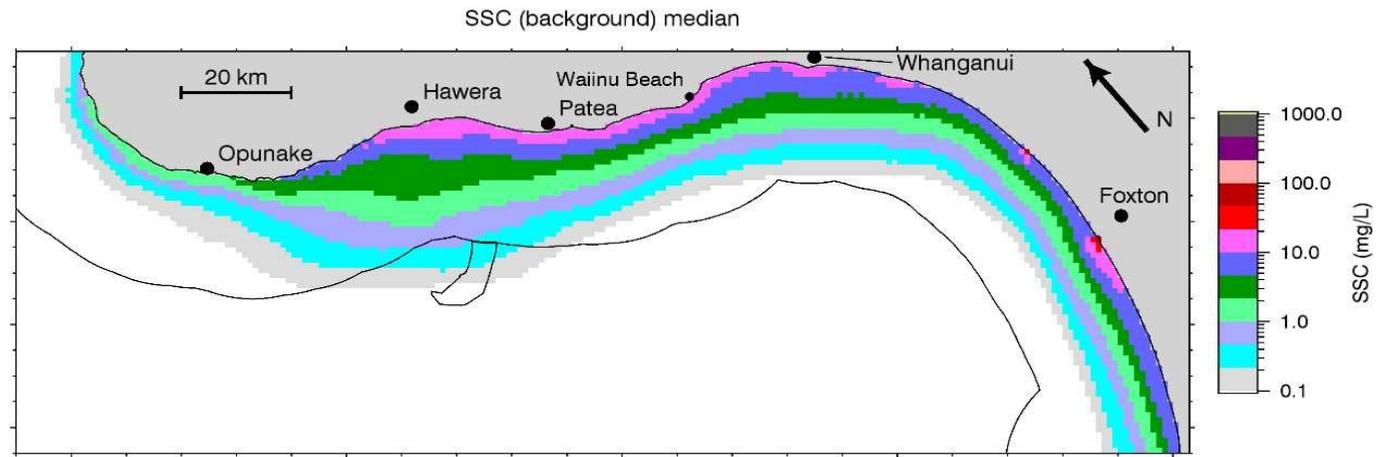
## Direct physical disturbance

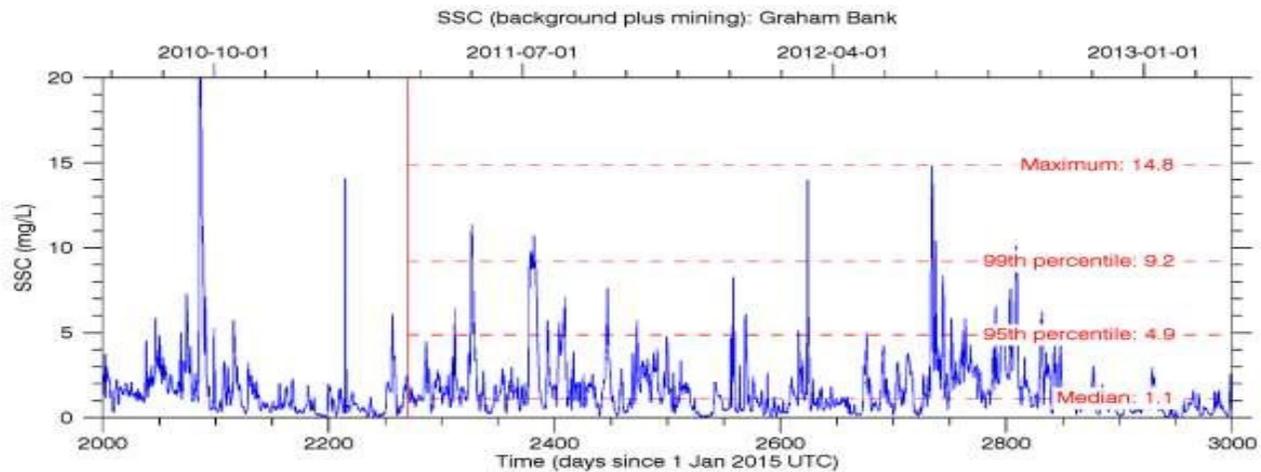
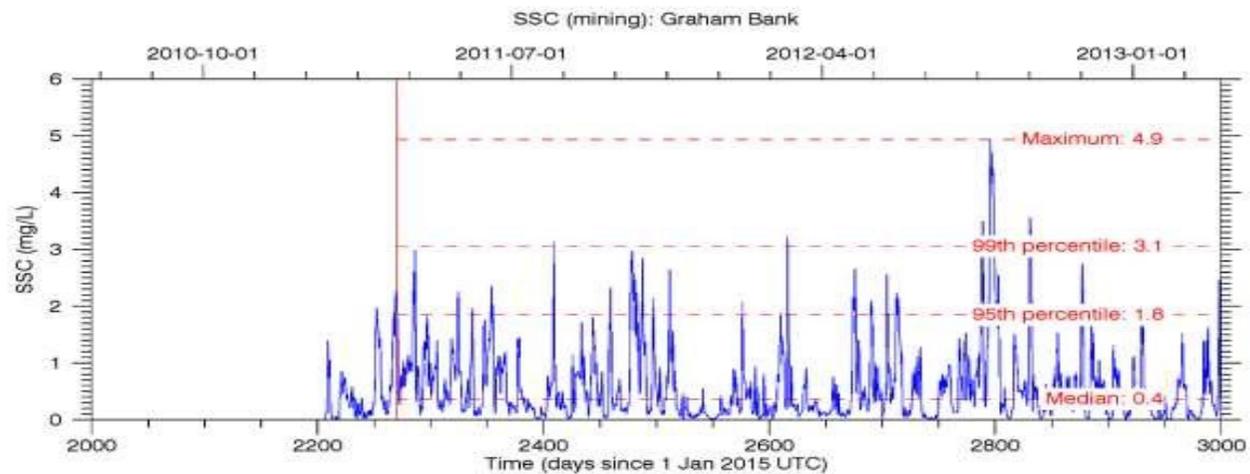
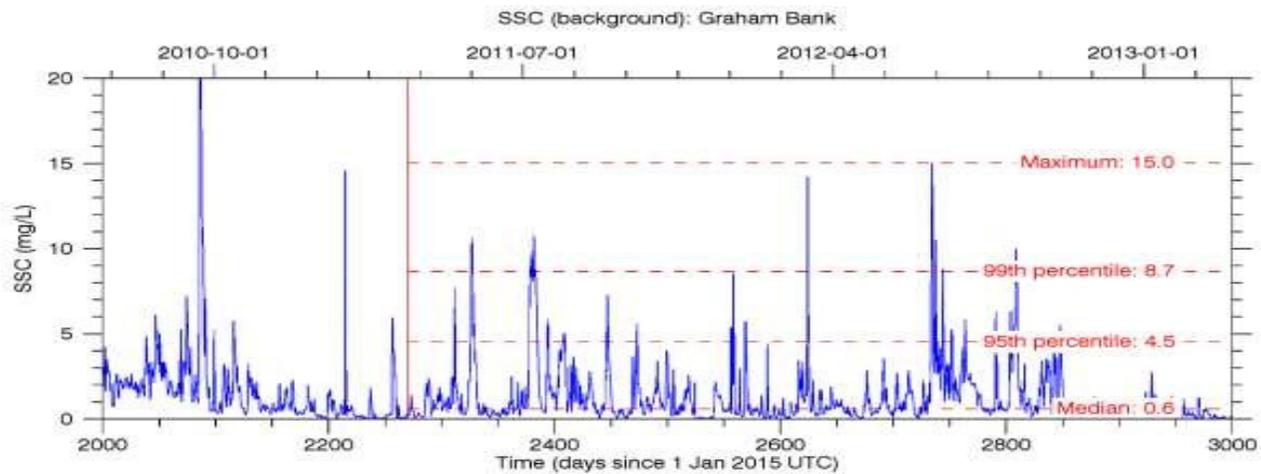
- **Low total invertebrate abundance and diversity, dominated by tube worms**
- **Loss of biota in immediate area, some small biota may survive**
- **0.03 %/mth and 0.3%/yr of the STB (20-40 m depth) impacted**
- **Area excavated negligible cf. to distribution and foraging of fish, birds and mammals**
- **Recovery by advection and recruitment**
- **Recovery weeks-months (early succession stages eg polychaete worms), to several years (larger bivalves, paua, kina, starfish)**

# Levels of suspended sediments from TTR operations

| Site                     | Median     |             | 99 <sup>th</sup> %ile |             |
|--------------------------|------------|-------------|-----------------------|-------------|
|                          | Background | With mining | Background            | With mining |
| <b>Inshore (surface)</b> | 20mg/L     |             | 100mg/L               |             |
| <b>Mining site</b>       | 0.4 mg/L   | 1.5 mg/L    | 2.7 mg/L              | 8.2 mg/L    |
| <b>2 km to the east</b>  | 0.4 mg/L   | 1.5 mg/L    | 2.7 mg/L              | 4.6 mg/L    |
| <b>8 km</b>              | 0.5 mg/L   | 1.3 mg/L    | 3.4 mg/L              | 4.5 mg/L    |
| <b>20 km</b>             | 0.9 mg/L   | 1.4 mg/L    | 5.9 mg/L              | 6.1 mg/L    |

- **Duration, frequency and levels of TSS within natural variability**





## Impacts of suspended sediment plume and sedimentation – cont.

- **Reductions in water column primary production minor <10 km of coast and overall in the SMD, transient**
- **Reductions in benthic primary production higher at site, minor at SMD scale, within natural variability**
- **Reductions in carbon flux**
  - **40% close to source (< 2km) but flow on effects at SMD scale no more than minor (4-6%), within natural variability**
- **Inshore communities adapted to high levels of TSS, sensitive communities well offshore (bryozoan rubble), soft-bottom communities can tolerate much higher TSS levels than predicted**
- **Transient water column community (phytoplankton/zooplankton) – significant advective processes**
- **Localised effects but no shift in wider ecosystem structure, functioning or productivity**

# Impacts of suspended sediment plume – cont.

- **Rocky reefs:**
  - **Occur throughout region, mostly inshore**
  - **More diverse and abundant fauna and flora**
  - **Macroalgae (eg kelps) very important for invertebrates and fish**
  - **Effects**
    - **The levels of suspended sediments within natural variability and tolerance levels for biota**
    - **The effects on biota no more than minor on reef communities beyond 20 km from the ISR**
- **Predicted levels well below thresholds for zooplankton (larval crustacea, copepods, larval fish), fish and mammals**

# Deposition and Contaminants

- **Deposition will be over an extensive area**
- **Negligible deposition rates :**
  - **< 2 mm/y in vicinity of ISR (< 2km)**
  - **<0.1 mm/y downstream**
- **Contaminants**
  - **Levels low in sediments but a few approaching ANZECC guidelines**
  - **Rapidly diluted below ANZECC guidelines**
  - **Included in monitoring**

## Rebuttal key points and caucusing

- **The application is based on extensive work, the best available information and sufficient to make a valid assessment of effects**
- **Monitoring is important to confirm predictions on effects**
- **The points raised by submitters have not affected conclusions in my first statement of evidence**
- **I agree that the BEMP and the EMMP should be revised to take into account important sites identified by submitters, parameters (metals) not already covered or clarified, some characterisation of the discharge plume and biomonitoring, and toxicity testing if levels are a concern.**