FINAL

Flemish Pass Exploration Drilling Project
2021 Drilling Discharges Follow-up Monitoring Program

Submitted to:

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1.0 INTRODUCTION

1.1 Regulatory Context

CNOOC Petroleum North America ULC (CNOOC) has been undertaking offshore exploration drilling in Exploration Licence (EL) 1144 (Pelles A-71 well) with a mobile offshore drilling unit (MODU). The program is subject to commitments in the Decision Statement issued under Section 54 of the *Canadian Environmental Assessment Act*, 2012 for the Flemish Pass Exploration Drilling Project (2018-2028). The monitoring program was designed to verify the accuracy of the predictions made during the environmental assessment as it pertains to fish and fish habitat and satisfy commitments in the Decision Statement issued under Section 54 of the *Canadian Environmental Assessment Act*, 2012; Condition 3.12 that states:

> *3.12 The Proponent shall develop and implement follow-up requirements, pursuant to condition 2.5, to verify the accuracy of the predictions made during the environmental assessment as it pertains to fish and fish habitat, including marine mammals and sea turtles, and to determine the effectiveness of mitigation measures identified under conditions 3.1 to 3.11. As part of these follow-up requirements, for the duration of the drilling program the Proponent shall:*
>
> > *3.12.1 for every well, measure the concentration of synthetic-based drilling fluids retained on discharged drill cuttings as described in the Offshore Waste Treatment Guidelines (OWTG) to verify that the discharge meets, at a minimum, the performance targets set out in the Guidelines and any applicable legislative requirements, and report the results to the Board;*
> >
> > *3.12.2 for the first well in each exploration licence, and for any well where drilling is undertaken in an area determined by seabed investigation surveys to be sensitive benthic habitat, and for any well located within a special area designated as such due to the presence of sensitive coral and sponge species, or a location near a special area where drill cuttings dispersion modelling predicts that drill cuttings deposition may have adverse effects, develop and implement, in consultation with Fisheries and Oceans Canada and the Board, follow-up requirements to verify the accuracy of the environmental assessment and effectiveness of mitigation measures as they pertain to the effects of drill cuttings discharges on benthic habitat. Follow-up shall include;*
> >
> > > *3.12.2.1 measurement of sediment deposition extent and thickness post-drilling to verify the drill waste deposition modeling predictions;*
> > >
> > > *3.12.2.2 benthic fauna surveys to verify the effectiveness of mitigation measures; and*
> > >
> > > *3.12.2.3 the Proponent shall report the information collected, as identified in conditions 3.12.2.1 and 3.12.2.2, including a comparison of modelling results to in situ results, to the Board within 60 days following the drilling of the first well in each exploration licence.*

The following document outlines the assessment of the concentration of synthetic-based drilling fluids retained on discharged drill cuttings, measurement of the drill cutting deposition thickness and extent, and monitoring of benthic fauna to verify the effectiveness of mitigation measures from drilling. In support of the post-drilling benthic surveys, CNOOC has contracted Wood Environmental & Infrastructure Solutions a division of Wood Canada Ltd. (Wood) to provide environmental monitoring services.

1.2 Background

CNOOC conducted pre-drilling underwater visual surveys at planned well sites in Exploration Licence (EL) 1144 in the Flemish Pass, including the Pelles A-71 site (Wood 2020). The survey was designed to determine locations of aggregations of coldwater corals and sponges and was developed in consultation with the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) and Fisheries and Oceans Canada (DFO) (Wood 2019a). The location of the planned Pelles A-71 well site was revised to maintain 100 m separation from drilling activities and C-NLOPB defined coral colonies (Wood 2019b). Fish and fish habitat were characterized for the area including details on seabed substrate and coral, sponge, fish, and invertebrate presence and density (Wood 2020).

1.3 Drill Cuttings Modelling

A drill cuttings dispersion model (Amec Foster Wheeler 2017) was conducted to predict the accumulations and footprint extent of drilling discharges as part of the Flemish Pass Exploration Drilling Project Environmental Impact Statement (EIS) (Nexen 2018). To account for different current regimes over the course of a year, four seasonal models for both water-based muds (WBMs) and synthetic-based muds (SBMs) were performed (Table 1-1). The EL1144 Deepwater Jurassic model was used for monitoring planning and comparison as it closely matched the drilling site in terms of depth and the location of the Pelles A-71 wellsite.

The deposition characteristics differed between type of drill mud used and season. From the model, it was predicted that greater than 90% of total drill cuttings (WBM and SBM) would settle within 500 meters of the drill center. Total drill cuttings footprint model outputs with the greatest extent of accumulations greater than the predicted no-effect threshold (PNET) of 6.5 mm was 0.06 km^2 (400 m by 150 m). For the more conservative PNET of 1.5 mm, greatest modelled extent was 0.182 km^2 (approximately 700 m by 260 m) (Amec Foster Wheeler 2017). While there is an effort to drill within a specific window, any field operation requires flexibility. To account for variations in the proposed drilling window, the results from the eight models (four WBM models and four SBM models) were combined to provide the largest predicted drill cutting dispersion footprint and accumulations (Figure 1-1).

Table 1-1 Modelled Cuttings Thickness by Distance, EL-1144 Deepwater Jurassic Example Well.

Scenario	Cuttings Type	Metric	Distance from Wellsite					
			0-10m	10-100m	100-200m	200-500 m	500m-1km	1-2km
			Cuttings Thickness (mm)					
March	WBM	Mean	716	19	1	1	-	-
		Maximum	2760	257	7	1	-	-
	SBM	Mean	0.4	2	8	2	0.5	0.1
		Maximum	1	24	47	31	1	0.2
June	WBM	Mean	793	18	1	1	-	-
		Maximum	2874	210	5	1	-	-
	SBM	Mean	10	6	3	1	0.1	0.1
		Maximum	12	21	38	22	1	0.4
September	WBM	Mean	712	19	2	1	-	-
		Maximum	2742	244	19	1	-	-
	SBM	Mean	37	12	1	1	0.2	0.1
		Maximum	48	47	7	9	7	0.5
December	WBM	Mean	688	19	4	1	-	-
		Maximum	2709	255	41	1	-	-
	SBM	Mean	0.1	1	6	3	0.2	0.1
		Maximum	0.2	6	42	42	1	0.3

Source: Amec Foster Wheeler 2017

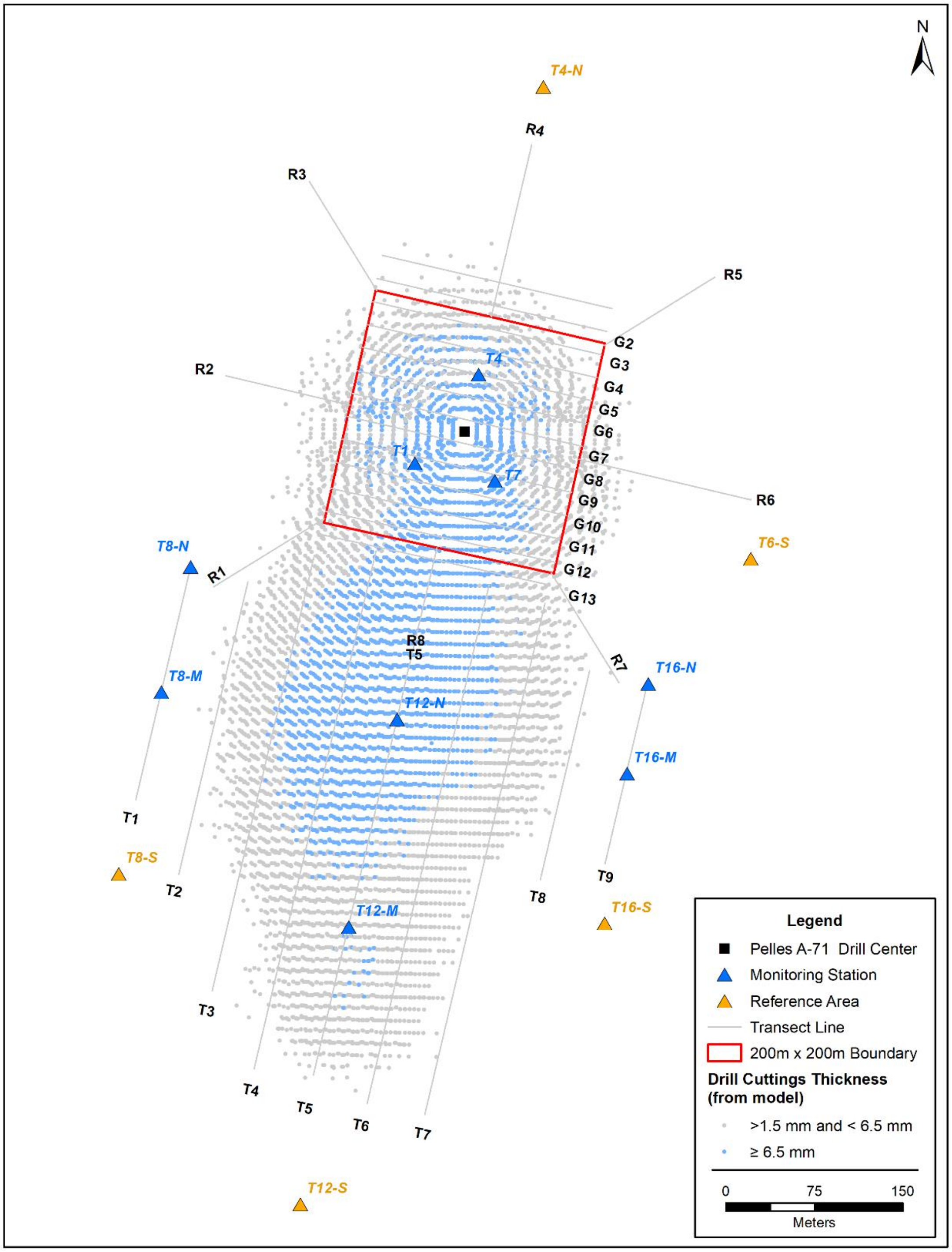

Figure 1-1 Pre-drilling survey design, drill cuttings monitoring locations, and predicted drill cutting model extent (combined seasonal footprints for WBM and SBM drill cuttings discharge).

1.4 Scope

The program monitoring tasks included assessment of the concentration of synthetic-based drilling fluids retained on discharged drill cuttings, measurement of the drill cutting deposition thickness and extent, and monitoring of benthic fauna to verify the effectiveness of mitigation measures from drilling. Results have been compared to predictions made from the drill cutting dispersion models presented in the EIS (Amec Foster Wheeler 2017, Nexen 2018) and densities on fauna from the pre-drilling survey at Pelles A-71 (Wood 2020).

2.0 METHODOLOGY

Monitoring was conducted as per the follow-up monitoring plan that was developed in consultation with C-NLOPB and DFO (Wood 2021a).

2.1 Synthetics on Cuttings

Monitoring of synthetic-based drilling fluids on drill cuttings (hereafter synthetics on cuttings; SOC) is summarized in the follow-up monitoring plan (Wood 2021a). SOCs on the drilling unit were sampled from the cuttings dryers, shale shakers, mud cleaners and centrifuges. Samples were be taken hourly in 1 kg sample portions with the SOC measured every 12 hours in accordance with the Procedure for Field Testing Oil Based Drilling Muds (API 1991). A mass-weighted rolling 48-hour average was calculated in grams of synthetic fluid per 100 grams wet solids. In accordance with the Offshore Waste Treatment Guidelines (OWTG), raw and averaged data as described in Section 2.4 of the OWTG was provided to the C-NLOPB monthly. As per the OWTG drill cuttings from SBM drilling operations was treated to meet a 48-hour mass weighted average of retained "synthetic-on-cuttings" not exceeding 6.9g /100g oil on wet solids (SBM limit). Cuttings were treated aboard the drilling unit using cuttings dryer technology, which is detailed in a separate report (CNOOC 2021).

2.2 Seabed Survey

Pre- and post-drilling visual seabed surveys followed the same design that included (see Table 2-1 and Figure 2-1):

- **Grid Lines Area:** a 200 m x 200 m area from the drill center (10 x 200-m transects, 20 m spacing; G3-G12, and 2 x 200 m transects above and below the main grid lines; G2 and G13),
- **Radials:** Eight radial transects 250 m from drill center (R1 – R8), and
- **Transect Area:** Nine transects that included the predicted drill cutting footprint (50 m spacing, T1 – T9).

Remotely Operated Vehicle (ROV) video was analyzed to characterize the surficial substrate, drill cuttings presence, and fauna. Transects were binned into 50 m sections (sections below 50 m are noted).

DOF subsea was responsible for chartering of the vessel ROV operations, Fugro was responsible for overall positioning, and Technip was responsible for overall logistics. All parties participated in vessel health and safety under the ultimate responsibility of the captain of the DOF *Skandi Vinland*. ROV positioning was determined using the vessel's high precision acoustic positioning (HiPAP) system which had a positioning accuracy of within 3 m based on field calibration. Transects were plotted from coordinates captured using the HiPAP system aboard the vessel with Fugro's geo-positioning software. These coordinates were then plotted using GIS software ArcMap v10.5 (ESRI 2016) for mapping, analysis, and reporting. Wood provided onboard marine biologists responsible for providing direction to ROV operators to ensure the collection of appropriate benthic video imagery for characterizing the benthic environment. Daily update reports were sent to CNOOC detailing project activities and survey progress.

Table 2-1 Centre coordinate for seabed survey site Pelles A-71.

Site	Latitude (N)	Longitude (W)	Northing (m)	Easting (m)
Pelles A-71	47°30' 11.90"	46°40' 39.14"	5262460.78	373668.24
Notes: Latitude and Longitude are in degree minutes seconds UTM coordinates in NAD83 (CSRS), Zone 23, EPSG: 26922				

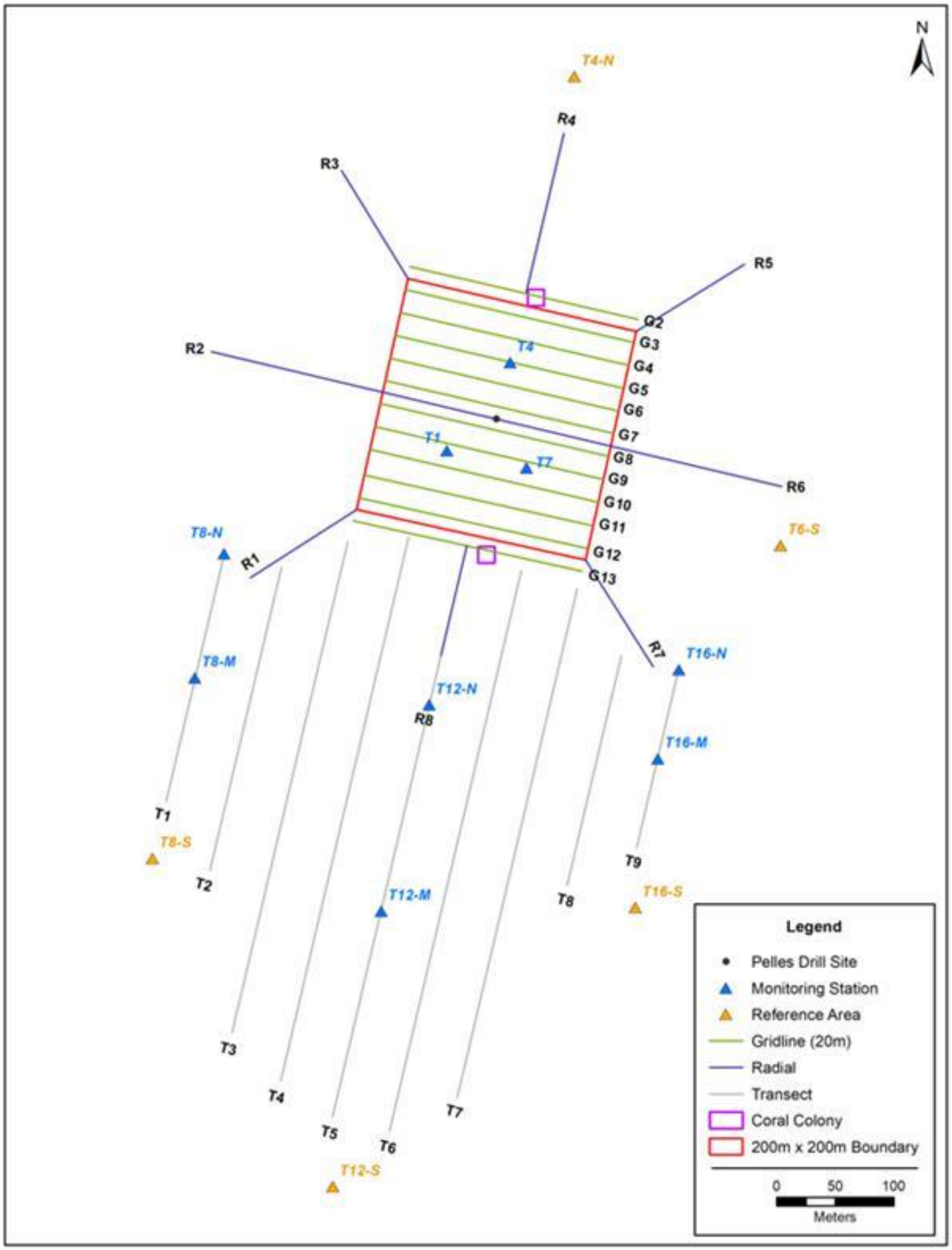

Figure 2-1 Map of 2021 ROV post-drilling survey showing visual survey lines and deposition pole and depth measurement monitoring stations.

2.2.1 Remotely Operated Vehicle

A Schilling Robotics Ultra Heavy Duty (UHD)-III ROV was used to collect video and still imagery at each site (Figure 2-2). Video was collected with a Schilling forward-facing (HD) and downward-facing (SD) camera at less than 2 m above the seabed at speeds of less than 1 km/hr along pre-determined transects of the survey design at each survey location. The ROV was equipped with a Schilling Ultra-High-Definition color camera pointed forward and downward at roughly a 45-degree angle. The video was overlaid with date, time, depth, line number, heading, and coordinates (UTM) (Figure 2-3). The seabed survey was geo-referenced using the vessels Hi-PAP system.

Figure 2-2 DOF Schilling ROV used for the seabed survey (Image courtesy of TechnipFMC, https://www.technipfmc.com/media/5b4p2j2r/data-sheet-schilling-uhd-iii.pdf).

Figure 2-3 Example of overlay showing heading, depth, altitude, northing and easting, dive number, date, time, and line number.

2.2.2 Surficial Substrate

Surficial geology was characterized by percent substrate type present within each 50 m section. Substrate type was estimated and compared to the Wentworth-Udden particle scale (Wentworth 1922, Kelly et al. 2009) (Table 2-2). As the predominant substrate was fines (e.g., mud), the largest secondary substrate class present by percentage was used for mapping.

Table 2-2 Wentworth-Udden particle scale for substrate type analysis.

Substrate Class	Substrate Type	Definition of particle size class
Bedrock		Continuous solid bedrock
Coarse	Boulder	Rocks greater than 250 mm
	Rubble	Rocks ranging from 130 mm-250 mm
Medium	Cobble	Rocks ranging from 30 mm to 130 mm
	Gravel	Granule size or coarser, 2 mm to 30 mm
Fine	Sand	Fine deposits ranging from 0.06 mm to 2 mm
	Mud	Material encompassing both silt and clay <0.06 mm
Organic/Detritus		A soft material containing 85 percent or more organic materials
Shells		Calcareous remains of shellfish or invertebrates containing shells

2.2.3 Drill Cuttings Extent

The spatial extent of drill cuttings was recorded based on visual cues (e.g., sediment colouration, texture patterns, sediment settlement after disturbance, biota) and classified into deposition categories (Table 2-3, Figure 2-4).

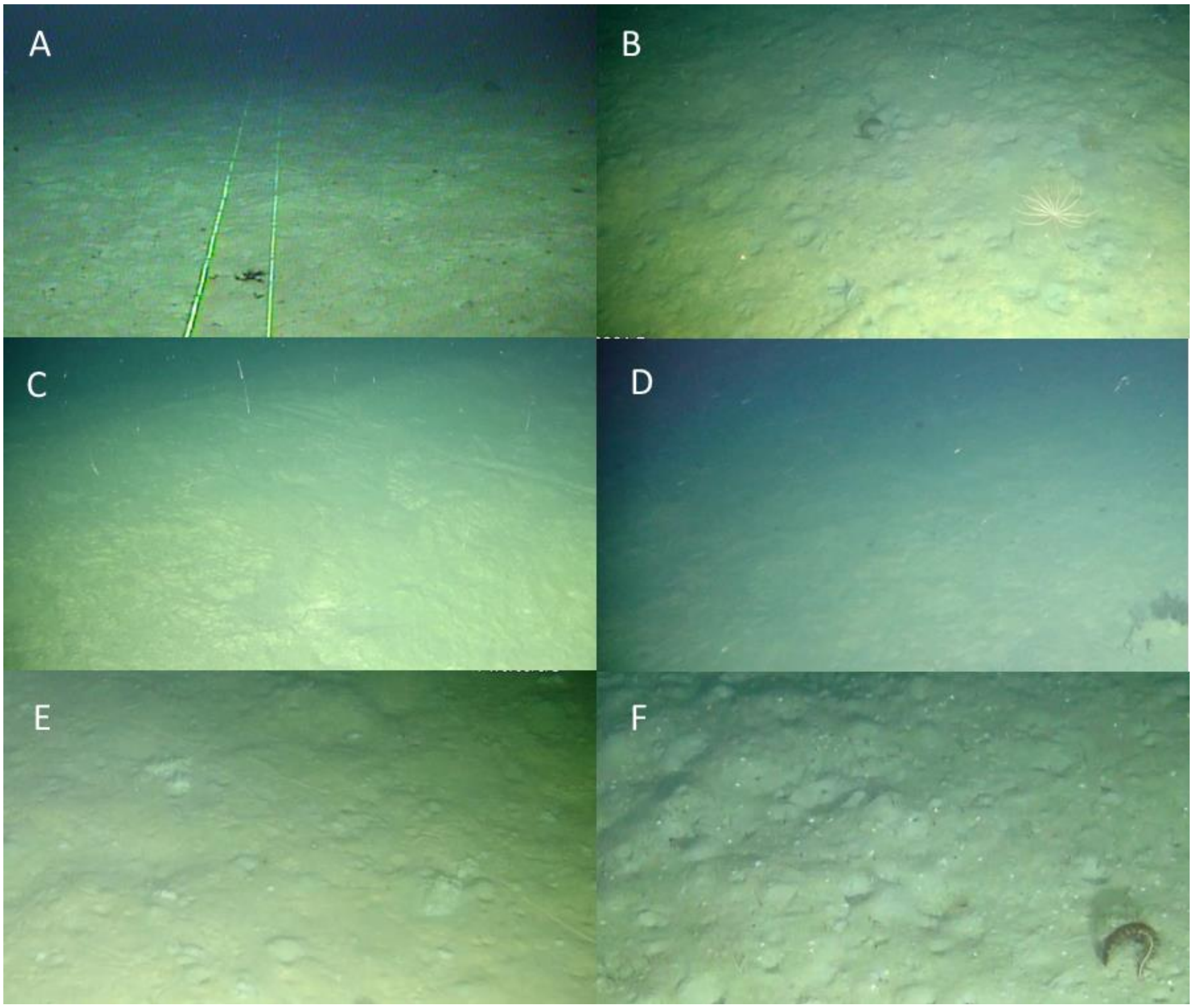

Figure 2-4 Example images of drill cuttings deposition encountered as part of the Pelles A-71 pre- and post-drilling survey: A) no visible deposition (pre-drilling survey), B) no visible deposition (post-drilling survey), C) visible deposition, D) transition zone, E) clusters, and F) flecks.

Table 2-3 Classification categories for visual assessment of drill cuttings deposition.

Category	Description
No visible deposition	No obvious visual cues of drill cuttings deposition or drill cuttings sedimentation on organisms. (Figure 2-4 A and B). Notable presence of benthic and burrowing organisms (e.g., anemones) on the seafloor. Organisms may be present with signs of biological activity (e.g., tracks, burrows).
Visible deposition	Unnaturally smooth sediment areas with no benthic organisms, though biological activity (e.g., tracks, burrows) may be present (Figure 2-4 C). Heavy deposition areas may form mounds.
Transition zone	Areas of intermittent and patchily distributed deposition that is difficult to identify visually (Figure 2-4D). Some biological activity (e.g., tracks, burrows) may be observed with notable lack of observations of burrowing organisms (e.g., anemones) on the seafloor.
Clusters	Irregularly shaped and sized aggregates of light grey coloured material (Figure 2-4E). These may be observed individually or patchily distributed on the seafloor. Areas of no visible deposition or flecks may be observed between drill cuttings clusters along with presence of organisms and signs of biological activity (e.g., tracks, burrows).
Flecks	Small irregularly shaped and sized aggregates of light-coloured material that gives the sediment a “starry” appearance but do not form accumulations (Figure 2-4F). Organisms may be present with signs of biological activity (e.g., tracks, burrows).

Notes:
Deposition categories are based on classifications and visual observations used in (Gates et al. 2017, Stout and Payne 2017, Jones et al. 2019, Cochrane et al. 2019, Wood 2021b, 2021c).

2.2.4 Drill Cuttings Thickness

Assessing the thickness of the drill cuttings was conducted by several monitoring techniques all illustrated in Figure 2-5:

- **Comparison to Subsea Infrastructure:** Measurements were taken from reference points on the well casing to the cuttings to determine the thickness in the area adjacent to the wellhead. Note that this measurement is only at the wellhead itself and is therefore a single measurement within the grid line area.
- **Depth Penetration Measurements**: Depth penetration measurements (three replicates) were taken at monitoring stations during pre- and post-drilling surveys (Figure 2-1). Measurements at the same general locations were used to determine if any large-scale variations in substrate depth took place.
- **Deposition Measurement Devices:** Measurement devices (Figure 2-5) were monitored after drilling to assess the thickness of the drill cuttings relative to reference stations to assess natural sedimentation over the same period. The measurement devices were deployed prior to drilling at monitoring stations (April 21, 2021) and photographed with the ROV during the post-drilling survey. Still imagery was analyzed post-survey to confirm the height of the cuttings using makings on the attached ruler and the measurement tool in the image analysis software ImageJ (Rueden et al. 2017).

For depth penetration and deposition measurements, there were three general areas monitored (as illustrated in Figure 2-1) with representative coverage in each:

- **Grid Lines Area:** These were the stations within the 200 m x 200 m box (i.e., the 'grid') around the wellhead, and were located approximately 50 m from the wellhead. In total, there were three stations in the grid lines area (T1, T4, and T7).
- **Transect Area**: These were stations located outside the grid lines area but still within the modelled drill cuttings footprint. There was a total of six stations in the transect area (T8-N, T8-M, T12-N, T12-M, T16-N, and T16-M)
- **Reference**: These were stations located outside the modelled drill cutting footprint and are considered reference and therefore the natural sedimentation rate within the area. There were five reference stations (T4-N, T6-S, T8-S, T12-S, and T16-S).

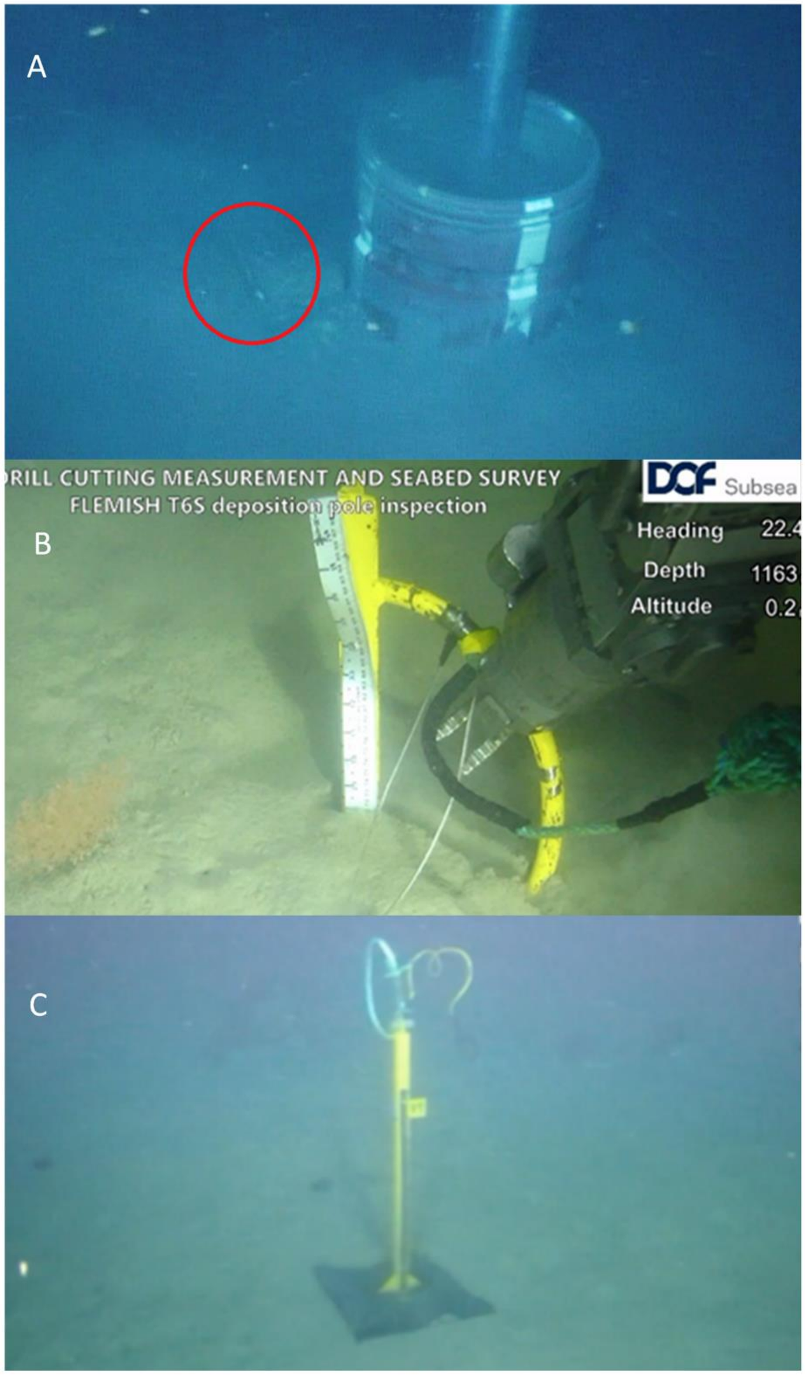

Figure 2-5 Illustrations of assessing sediment thickness showing comparison to seabed infrastructure (A), depth penetration measurements (B), and deposition measurement device (C).

2.2.5 Benthic Fauna

All macrofauna within the field of view were enumerated to functional groups or phyla for each 50 m section. Corals and sponges were categorized into widely used functional/morphological groups that have been established and defined across several identification guides (e.g., Kenchington et al. 2015). Coral and sponge identification to species typically requires recovered specimens as distinguishing features may require examination under magnification by a qualified taxonomist. No coral or sponge specimens were collected during the seabed survey. Coral functional groups are generally based on shape and species characteristics (Table 2-4). Sponge morphological groups are based on overall shape with numerous species comprising each group (Table 2-4). The condition of corals and sponges, including health, visible sedimentation, and burial was estimated based on visual observations (Table 2-4).

All other invertebrate taxa were identified to phylum, and fish were identified to functional groups (Ollerhead et al. 2017, Wells et al. 2019). Faunal identification was dependent on the quality of the imagery and prominence of identifying characteristics. While the survey was not specifically designed to assess the presence of Species at Risk (SAR), they were also identified where possible.

Table 2-4 Coral and sponge functional groups and condition classifications.

Group	Functional Groups	Condition
Coral	• Soft corals (Alcyonacea) • Black corals (Antipatharia) • Hard corals (Scleractinia) • Branching corals (Alcyonacea) • Sea pens (Pennatulacean)	• Good (G): Coral is oriented upright with polyps extended and no visible sedimentation • Damaged (Dm): A portion of the coral is covered with sediment and/or a percentage of polyps are missing • Dead (D): Coral skeleton with no polyps
Sponge	• Solid / Massive • Leaf / Vase shaped • Round with projections • Thin-walled, Complex • Stalked • Other (e.g., encrusting sponge, finger sponge)	• Surface veneer (S): Surface of a sponge has a veneer of sedimentation. Distinctions cannot made between natural or drill cutting sediment veneers. • Covered (C): The base of the sponge or a portion of the body is obscured by accumulated sediment.

2.3 Statistical Analysis

Two-way ANOVAs were calculated using the R statistical package (R Core Team 2020), with graphs created using the packages ggplot2 and gridExtra (Wickham 2016, Auguie 2017). Statistical comparisons were completed for benthic species that were relatively abundant throughout the survey areas, visually conspicuous, and relatively immobile. Lower density species groups were qualitatively compared between surveys and areas as uncommon species can overly influence statistical comparisons. Qualitative comparisons were also conducted for small, inconspicuous species groups (e.g., burrowing anemones) as observations could be influenced by ROV altitude above seabed and camera zoom magnification.

3.0 RESULTS

During the 2021 survey aboard the *Skandi Vinland* (Table 3-1), over 12 hours of ROV video spanning over 6,600 m of seafloor was collected at Pelles A-71. Survey water depth ranged from 1159 m to 1162 m, with good visibility throughout the area. Average ROV field of view was 5.65 m based on three randomly chosen still images with deposition poles present for use as a calibration scale.

Table 3-1 Summary of relevant activities at the Pelles A-71 well site. The post-drilling survey commenced 33 days after well abandonment.

Survey	Dates	Details	Description
EL 1144 Seabed Survey	Jul 15-18, 2019	Vessel: MV *Horizon Star* ROV: Magnum 157	Pre-drilling surficial substrate, coral, sponge, fish, and other invertebrate characterization
Deposition Pole Placement	Apr 19-20, 2021	Vessel: DOF *Skandi Vinland* ROV: Schilling UHD-3-26	Placement of drill cuttings deposition measurement devices. Penetration measurements
Drilling	Apr 28-May 5, 2021 (Top Hole) Jetted May 6 to July 6, 2021 (Deeper Hole sections)	Drill Rig: *Stena Forth*	Note that the top-hole drilling included the use of WBM cuttings that are released in close proximity to the seafloor within the vicinity of the wellhead. The deeper hole drilling used SBMs and those cuttings are dried, treated, and tested for compliance prior to being released from the sea surface. June 4 - Opportunistic images captured of deposition poles and the wellhead within grid lines area. The abandonment of the Pelles A-71 exploration well was on July 6, 2021.
Post-Drilling Survey	Aug 8-11, 2021	Vessel: DOF *Skandi Vinland* ROV: Schilling UHD-3-26	Post-drilling surficial substrate, coral and sponge, fish, and other invertebrate characterization. Analysis and retrieval of the drill cuttings deposition measurement devices. Penetration measurements

3.1 Synthetics on Cuttings

CNOOC had a performance target for SOC discharged to sea based on the Offshore Waste Treatment Guidelines of not exceeding 6.9g/100g oil on wet solid. This target was maintained for the duration of the campaign with 3.84g/100g 48 hour cumulative (rolling) massed average SOC wet being the highest level reached (Figure 3-1) (CNOOC 2021). CNOOC reported the discharged SOC results to the C-NLOPB on a monthly basis.

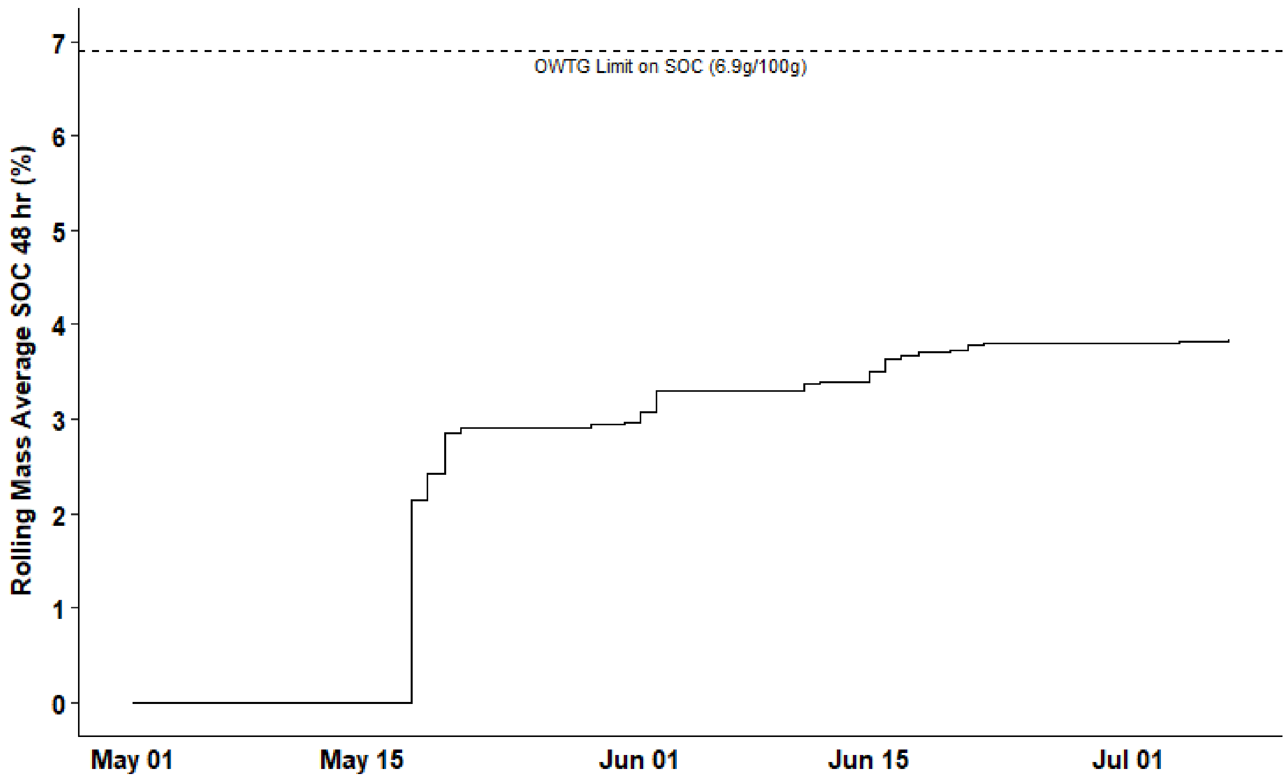

Figure 3-1 Synthetic-on-Cuttings (SOC) concentration (g of oil per 100 g wet solids, or %) discharged to sea after treatment aboard the *Stena Forth* from May 1st, 2021, to July 7th, 2021.

3.2 Surficial Substrate

During the pre-drilling survey at Pelles A-71, fine substrate (mud) was the primary surficial substrate present throughout, with hard substrates (coarse (rubble/boulder) and medium (gravel/cobble)) comprising 15 percent or less in any given transect section. In the post-drilling survey, the same general substrate conditions were recorded (Figure 3-2). The biggest difference between the pre- and post-survey observations is the additional fines near and to the south of the well centre (Figure 3-3). This corresponds to the area of visible drill cuttings deposition (see Section 3.3.1). The predominant hard substrate in both surveys was 5% to 10% coarse, with no major changes to coverage recorded for this substrate classification. Medium substrates were present within the grid box in both surveys, with some lines in the transect area changing from having coarse substrate in the pre-drilling survey to medium in the post-drilling survey. However, fine substrate remained at 85% to 100% of the surficial substrate at this site.

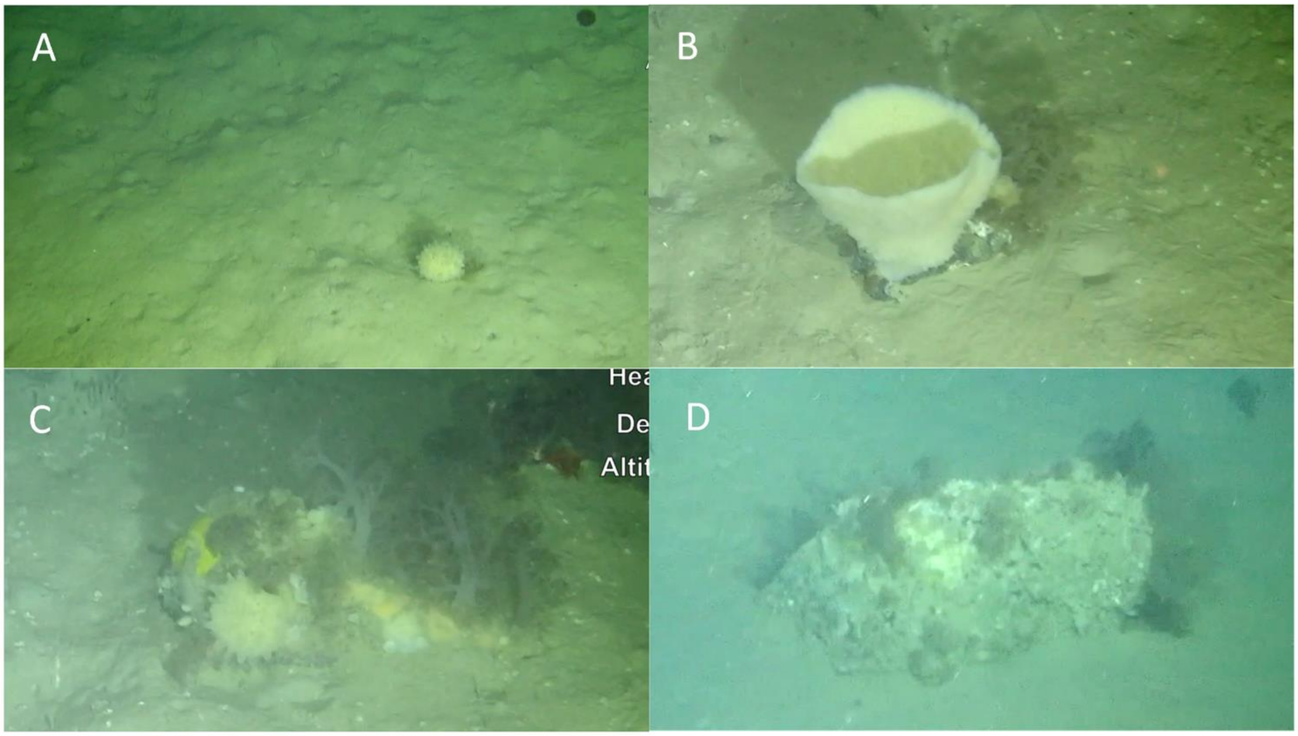

Figure 3-2 Examples of substrate categories encountered as part of the Pelles A-71 post-drilling survey: A) mud substrate common throughout the site (fines), B) cobble sized rock (medium), C) rubble sized rock (coarse), and D) boulder (coarse).

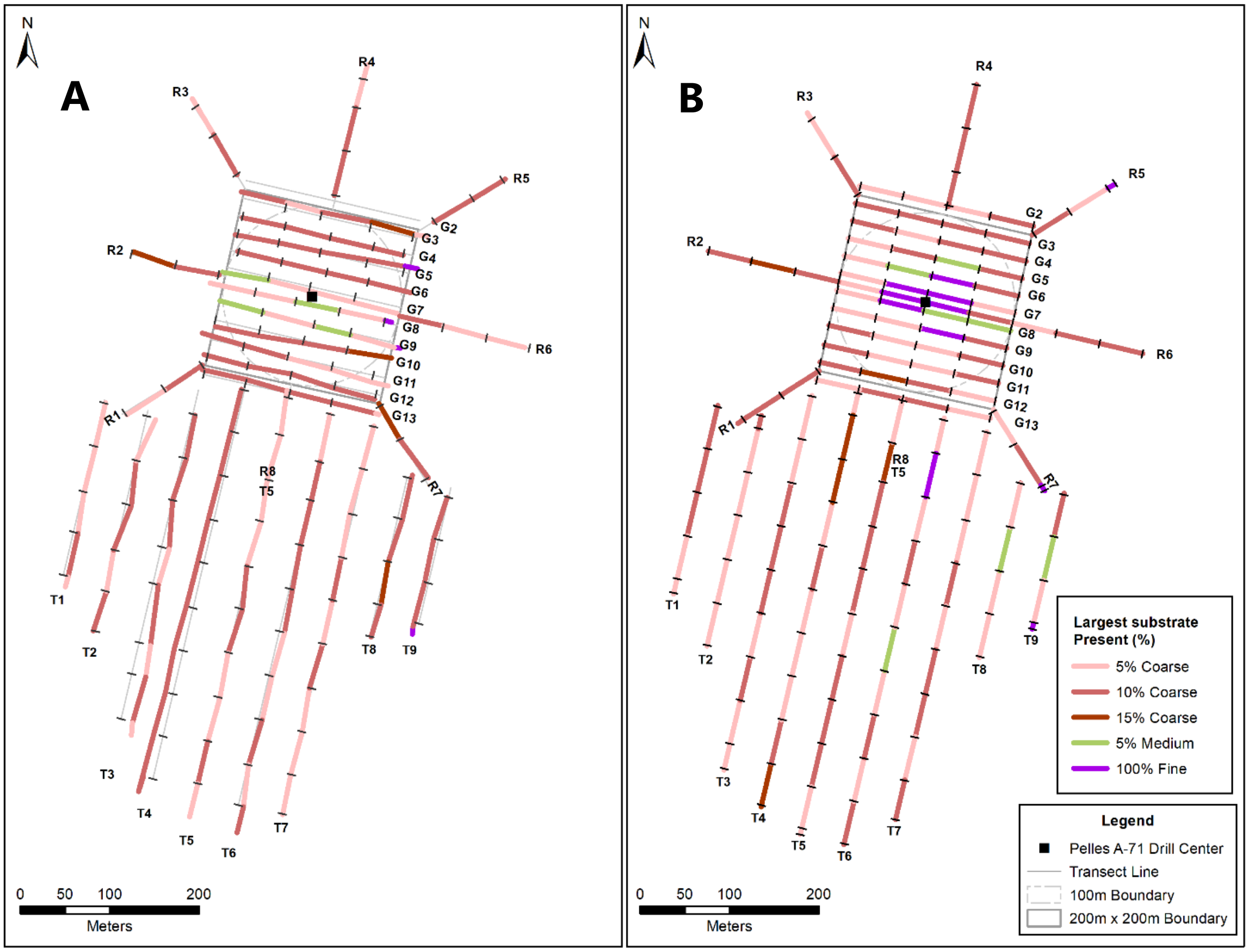

Figure 3-3 Largest substrate present and associated percent coverage in each transect section at Pelles A-71 in the pre-survey (A) and post-survey (B).

3.3 Drill Cuttings Extent and Thickness

3.3.1 Drilling Cuttings Extent

Drill cuttings were distributed throughout the survey area with drill cuttings accumulations near the wellhead that decreased with distance, and sporadic drill cuttings occurrences further afield. Visible cuttings deposition areas were recorded within the grid lines area within approximately 50 m of the wellhead along lines G5 to G10 (Figure 3-4). Surrounding the visible deposition areas were transition zones that showed patchy areas of cuttings and reduced faunal presence and activity (Figure 3-4). These areas were mainly observed within 100 m from the wellhead inside the grid lines area. Aside from a small transition zone along eastern radial (transect R6), drill cuttings were not visually recorded along radials towards the north, east, or west (Figure 3-4).

Areas of patchy drill cuttings clusters and flecks were observed south of the wellhead (Figure 3-4). Drill cuttings clusters were recorded as single or multiple clusters and were primarily to the southwest approximately 90 to 375 m from the drill center. Drill cuttings flecks did not form accumulations and were recorded up to 625 m from the wellhead, mainly in central and western transects of the southern survey area. No visible deposition was recorded along southeastern transects.

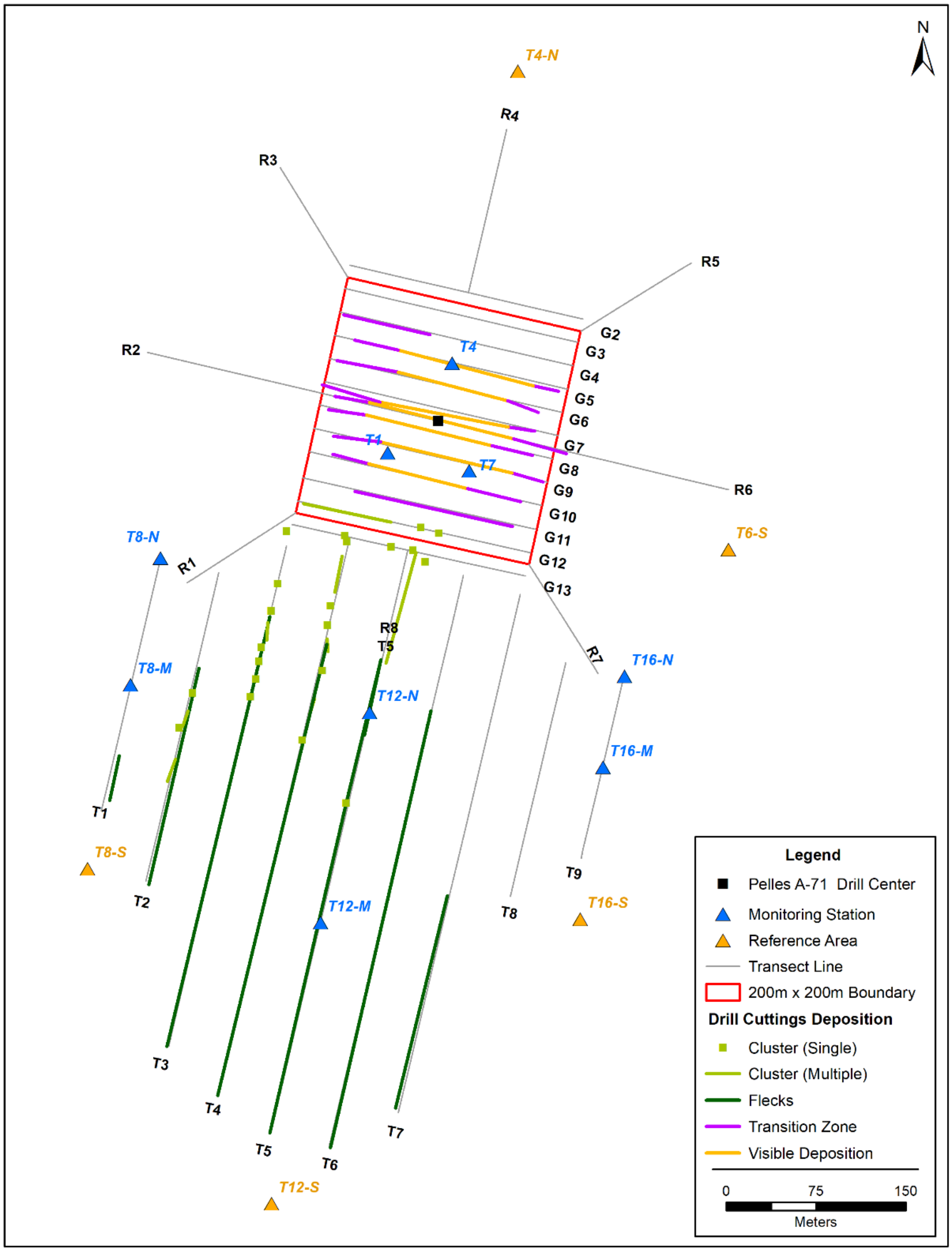

Figure 3-4 Drill cuttings deposition categories observed on video survey lines at Pelles A-71.

3.3.2 Drill Cuttings Thickness

The results of the three monitoring techniques for assessing drill cutting dispersal thickness (comparisons to subsea infrastructure, penetration measurements, and deposition measurements) are discussed below.

Comparison to subsea infrastructure

When the wellhead was placed prior to drilling, the ball valve handle was 1.5 m above the seabed. Once top-hole drilling was complete, the ball valve handle was flush with the seabed indicating an accumulation of approximately 1.5 m in the immediate vicinity of the wellhead (Figure 3-5). This would likely have been the highest accumulation as the wellhead was jetted soon after this photo was taken.

Figure 3-5 Image showing the 1.5 m accumulation of drill cuttings around the wellhead. The ball valve (circled) is flush with the cuttings level and is located 1.5 m above the seafloor.

Depth Penetration Tests

The results of the depth penetration measurements are summarized in Table 3-2 with an illustration in Figure 3-6. Overall, depth penetrations showed a difference of between 20 cm shallower to greater that 60 cm deeper between the pre- and post-drilling surveys (Table 3-2).

The stations within the grid lines area (within 50 m of the wellhead; T1 and T4) showed shallower post-drilling penetrations (an average of 20 and 18 cm shallower, respectively). The measurements within the transect area (outside the grid lines area but within the modelled drill cutting footprint) measured an average 10 to 60 cm increase in penetration. Similarly, measurements in the reference showed an average 0 to 60 cm increase in penetration. Figure 3-6 illustrates the penetration tests at each of the three areas prior to and post drilling.

Table 3-2 Depth Penetration and Deposition Measurements.

<table>
<tr><th rowspan="2">Area</th><th rowspan="2">Station</th><th rowspan="2">Pole #</th><th colspan="3">Penetration Tests</th><th colspan="2">Deposition Pole Accumulation (cm)</th></tr>
<tr><th>Pre (cm)</th><th>Post (averaged) (cm)</th><th>Change (cm)</th><th>Jun 4, 2021</th><th>Aug 8-9, 2021</th></tr>
<tr><td rowspan="3">Grid Area</td><td>T1</td><td>15</td><td>100+</td><td>80</td><td>-20</td><td>~20</td><td>20</td></tr>
<tr><td>T4</td><td>5</td><td>90</td><td>72</td><td>-18</td><td>~20</td><td>15</td></tr>
<tr><td>T7</td><td>3</td><td>>100</td><td>-</td><td>-</td><td>~20</td><td>-</td></tr>
<tr><td rowspan="6">Transect Area</td><td>T8-M</td><td>6</td><td>90</td><td>>100</td><td>>10</td><td>-</td><td>0</td></tr>
<tr><td>T8-N</td><td>2</td><td>86</td><td>>100</td><td>>14</td><td>-</td><td>0</td></tr>
<tr><td>T12-M</td><td>13</td><td>40</td><td>>100</td><td>>60</td><td>-</td><td>0</td></tr>
<tr><td>T12-N</td><td>7</td><td>46</td><td>>100</td><td>>54</td><td>-</td><td>0</td></tr>
<tr><td>T16-M</td><td>12</td><td>68</td><td>>100</td><td>>32</td><td>-</td><td>0</td></tr>
<tr><td>T16-N</td><td>14</td><td>78</td><td>>100</td><td>>22</td><td>-</td><td>0</td></tr>
<tr><td rowspan="5">Reference Stations</td><td>T4-N</td><td>8</td><td>>100</td><td>>100</td><td>0</td><td>-</td><td>0</td></tr>
<tr><td>T6-S</td><td>10</td><td>46</td><td>>100</td><td>>54</td><td>-</td><td>0</td></tr>
<tr><td>T8-S</td><td>1</td><td>40</td><td>>100</td><td>>60</td><td>-</td><td>0</td></tr>
<tr><td>T12-S</td><td>11</td><td>79</td><td>>100</td><td>>21</td><td>-</td><td>0</td></tr>
<tr><td>T16-S</td><td>4</td><td>64</td><td>>100</td><td>>36</td><td></td><td>0</td></tr>
<tr><td colspan="8">Notes:
All post measurements were completed at the grid lines area stations on June 4th and in August 2021 (33 days after drilling) with the exception of T-7 which was measured on June 4 only. No post-drilling penetration test was conducted for T7.
For penetration tests, the baseline measurement (pre) was from a single test and the post drilling measurements (post) were from an average of three tests.
>100 cm measurement indicates that the ROV arm was able to push the meter stick more than 100 cm into the sediment</td></tr>
</table>

Figure 3-6 Examples of depth penetrations tests conducted within the grid lines area (A-1 and A-2), the transect area (B-1 and B-2), and a reference station (C-1 and C-2). Images on the left represent the pre-drilling depth penetrations, and images on the right are from the post-drilling survey.

Deposition Pole Accumulation

The results of the deposition measurements are summarized in Table 3-2 with illustrations in Figure 3-7. Overall, the accumulations range from 0 to 20 cm with most stations having no accumulation (as measured by the meter stick), only a thin veneer of presumed background sedimentation. All but one station was visited during the post-drilling survey in August, with the exception of pole T7 which was knocked over during other subsea infrastructure post-drilling recovery operations. Grid line stations had multiple measurements as they were within the vicinity of drilling activities, therefore the ROV could opportunistically visit them, though no close-up video was taken so deposition was estimated to within 10 cm.

The stations within the grid lines area were the only deposition poles with measurable accumulations on the scaling bar (Table 3-2, Figure 3-7). On the first post-drilling measurement (June 4, 2021, 31 days after top hole drilling), the total accumulation was 20 cm for all three poles. For the 2nd post-drilling measurement (August 8, 2021), the total accumulations were 20 cm and 15 cm for T1 and T4, respectively, the two remaining poles in the grid lines area. All three stations were within 50 m of the wellhead.

For the stations in the transect area (within the modelled drill cuttings footprint), there were no measurable accumulation on the scaling ruler though light dustings were present at most stations (Table 3-2, Figure 3-7). For most of the stations in the transect area, the veneer of material recorded post-drilling appears to match the seafloor in colour and appearance and so may be indicative of background deposition/movement of typical sediment in the area (Figure 3-7). However, T12-N (160 m from the wellhead) appeared to have visible flecks present (Figure 3-7).

The reference stations (Figure 3-7); from 263 to 671 m from the wellhead had no measurable accumulation on the scaling ruler (Table 3-2) with deposition ranging from complete covering of the base plate to sporadic covering (Figure 3-7). For all the references, the post-drilling material on the base plates matched the seafloor in colour and appearance and therefore may be indicative of background sedimentation/movement.

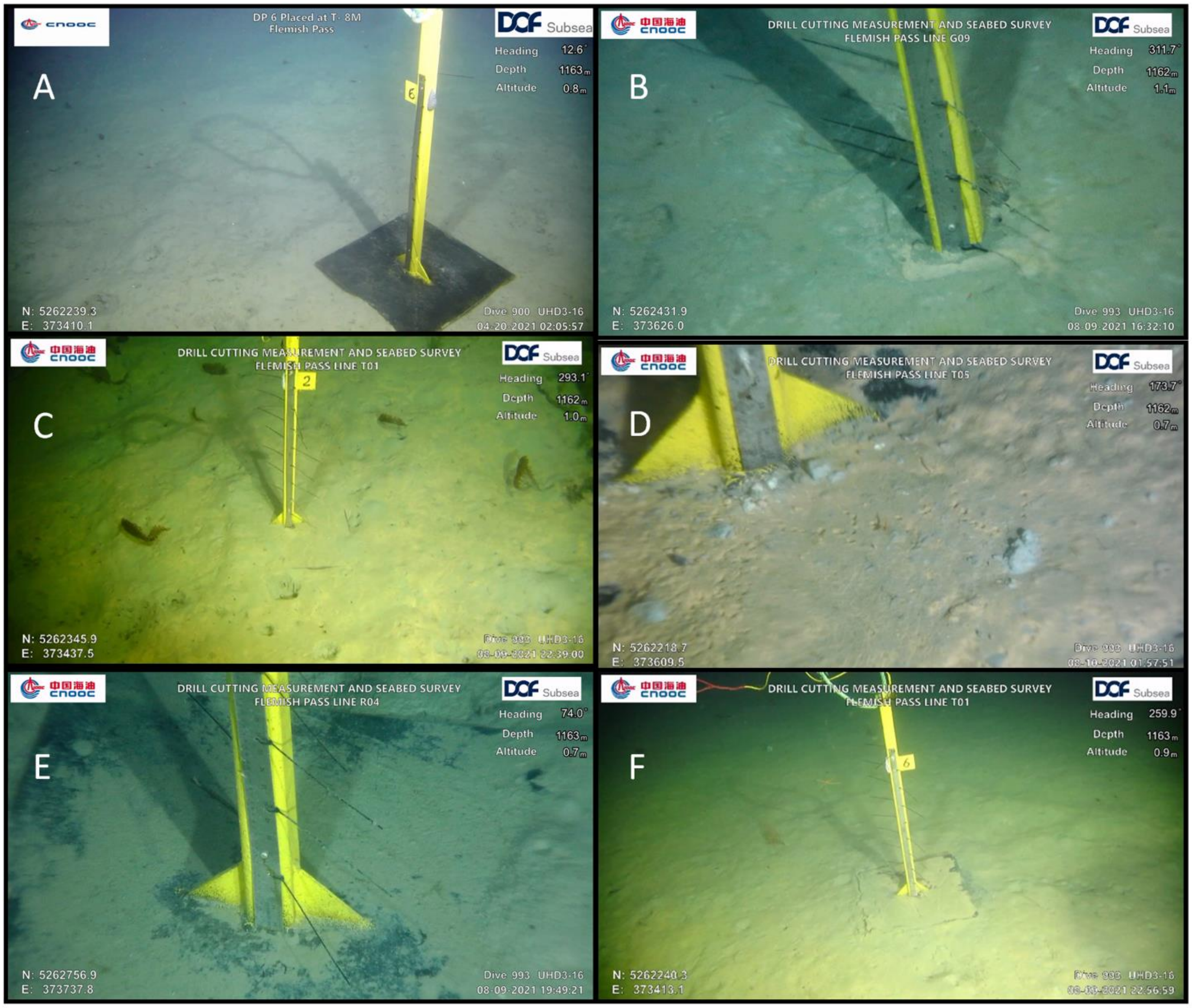

Figure 3-7 Examples of deposition poles: A) immediately after placement in the transect area (T8-M), B) post-drilling within in grid lines area with measurable accumulation of what appears to be drill cuttings (T1), C) post-drilling within the transect area with background sedimentation (T8-N), D) post-drilling within the transect area with flecks (T12-N), E) post-drilling at a reference station with sporadic dusting (T4-N), and F) post-drilling at a reference station with almost complete covering of the base plate (T8-M).

3.4 Benthic Fauna

3.4.1 Corals

In the pre-drilling survey, soft corals were the most abundant coral group overall, followed by sea pens, branching corals, and black corals. No hard corals were recorded during the 2019 survey. In the post-drilling survey, the same overall coral groups were recorded (Figure 3-8). Comparing across both surveys, nearly all coral groups had lower densities in the post-drilling survey in all three survey areas, with the exception of soft corals in the radials (Table 3-3). Soft corals and sea pens across the two surveys (pre- and post-drilling) and the three areas (grid lines area, radials, and transect area) were compared using two-way ANOVAs.

For soft corals and sea pens, larger declines were noted in the grid lines area (42% and 61% decrease, respectively) and transect area (41% and 47% decrease, respectively) compared to the radial area (3% increase and 26% decrease, respectively) (Table 3-3, Figure 3-9, Figure 3-10, Figure 3-14). Soft corals significantly differed between surveys ($p=<0.001$), areas ($p=0.034$), and the interaction term ($p=0.024$) (Table 3-4, Figure 3-9). Sea pens also significantly differed between surveys ($p=<0.001$) and the interaction term ($p=0.008$), but not between areas (Table 3-4, Figure 3-9). Soft corals and sea pens were near-absent within 50 m of the drill centre, which corresponds to the visible deposition area for cuttings (Figure 3-4, Figure 3-10, Figure 3-14).

Decreases were recorded across the grid lines and radials areas for branching corals (64% and 71% decrease, respectively), though only a minor decrease was noted for the transect area (6% decrease) (Table 3-3, Figure 3-13). No branching corals were recorded along any survey lines within 50 m of the drill centre (Figure 3-13).

In both the pre- and post-drilling surveys, a single black coral was noted on line G9 just to the SW of the drill centre, and this may be the same individual (Table 3-3, Figure 3-11). No hard corals were observed in the pre-drilling survey; however, two were recorded along survey transects in the transect area in the post-drilling survey (Table 3-3, Figure 3-12).

Coral condition throughout Pelles A-71 was similar across the pre- and post-drilling surveys. During the pre-drilling survey, corals were largely upright and healthy in appearance. Occasional corals were recorded missing <50% of polyps or were prone on the seafloor. No deceased corals were noted in the pre-drilling survey. The post-drilling survey showed similar coral condition, with few records of corals missing <50% of polyps or laying on the seafloor (Figure 3-15 A, B). No dead corals skeletons or corals with any amount of burial (visible sedimentation or build-up on stalk) were recorded during the post-drilling survey.

Coral categorized as damaged condition were found throughout the three survey areas (grid lines area, radials, and transect area) during post-drilling surveys. There were relatively higher observations of damaged corals in the radials and transect area lines compared to the grid lines area, however, this may be due to fewer observations of corals within the visible deposition area near the wellhead.

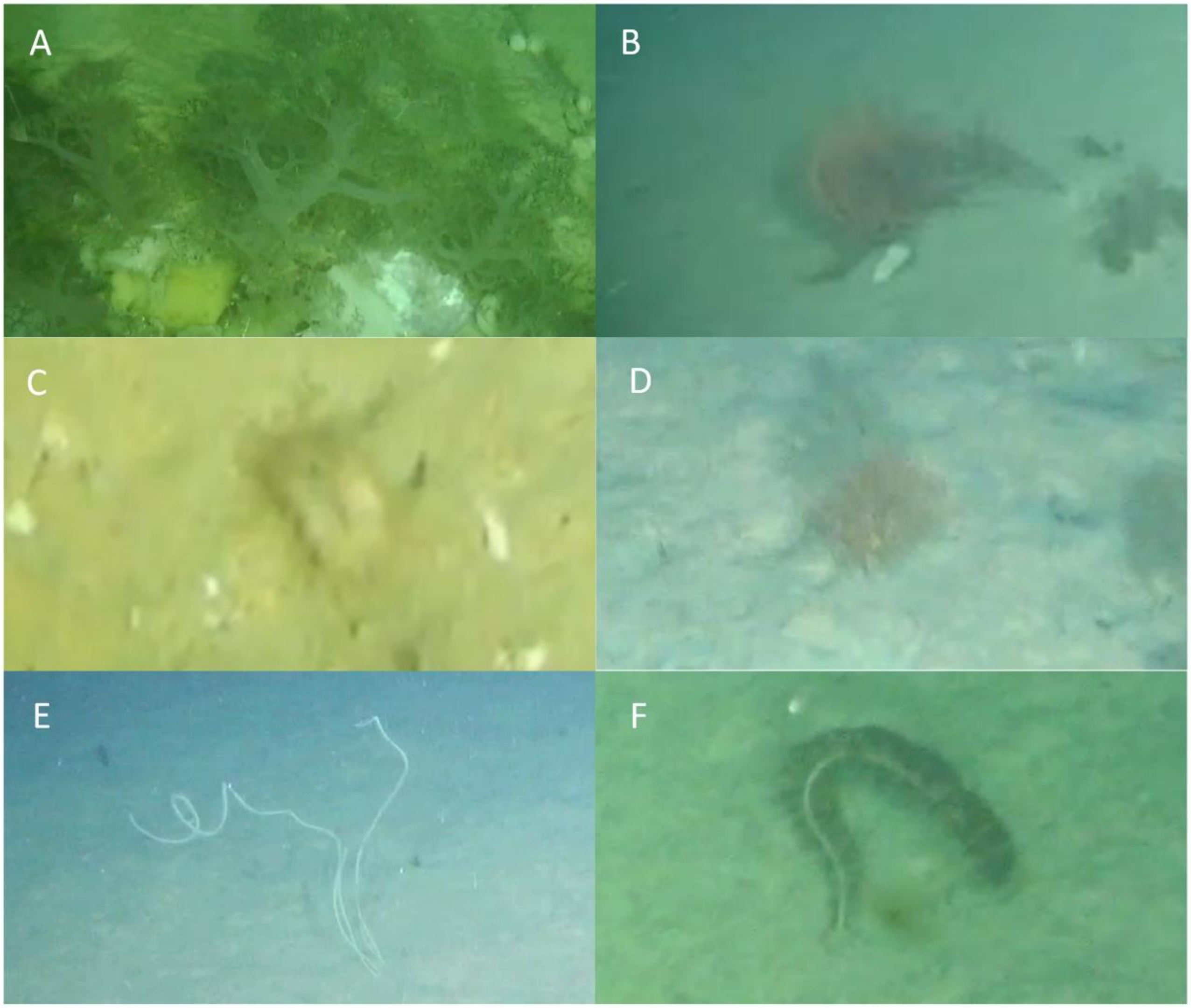

Figure 3-8 Example images of coral groups encountered as part of the Pelles A-71 post-drilling survey: A) nephtheid coral (soft coral), B) black coral (black coral), C) cup coral (hard coral), D) *Acanella* sp. (branching coral), E) *Radicipes* sp. (branching coral), and F) *Anthoptilum* sp. (sea pen).

Table 3-3 Coral group density summary across areas during pre-drilling (2019) and post-drilling (2021) surveys.

Taxa Group	Area	Year	Density (ind/m²)				
			Mean	St.Dev.	Median	Min*	Max
Soft Corals	Grid Lines	2019	0.171	0.082	0.159	0.038	0.448
		2021	0.099	0.080	0.097	0.004	0.372
	Radials	2019	0.143	0.064	0.134	0.041	0.283
		2021	0.148	0.041	0.156	0.042	0.219
	Transect Area	2019	0.208	0.125	0.192	0.036	0.991
		2021	0.123	0.065	0.112	0.011	0.319
Black Corals	Grid Lines	2019	<0.001	0.001	0	0.007	0.007
		2021	<0.001	<0.001	0	0.004	0.004
	Radials	2019	0	0	0	0	0
		2021	0	0	0	0	0
	Transect Area	2019	0	0	0	0	0
		2021	0	0	0	0	0
Hard Corals	Grid Lines	2019	0	0	0	0	0
		2021	0	0	0	0	0
	Radials	2019	0	0	0	0	0
		2021	0	0	0	0	0
	Transect Area	2019	0	0	0	0	0
		2021	<0.001	0.001	0	0.004	0.004
Branching Corals	Grid Lines	2019	0.028	0.023	0.021	0.003	0.151
		2021	0.008	0.008	0.007	0.004	0.032
	Radials	2019	0.033	0.062	0.014	0.007	0.248
		2021	0.012	0.008	0.013	0.004	0.028
	Transect Area	2019	0.016	0.018	0.014	0.007	0.073
		2021	0.015	0.008	0.014	0.004	0.035
Sea Pens	Grid Lines	2019	0.150	0.056	0.152	0.045	0.366
		2021	0.059	0.039	0.062	0.004	0.138
	Radials	2019	0.113	0.047	0.114	0.021	0.193
		2021	0.084	0.027	0.074	0.039	0.142
	Transect Area	2019	0.142	0.074	0.128	0.048	0.582
		2021	0.075	0.029	0.074	0.021	0.225

Notes:
Only sections above 10 m linear distance were included for summary statistics
*Min is the smallest non-zero density value

Table 3-4 Two-way ANOVA comparison of soft coral (top) and sea pen (bottom) densities between the pre- and post-drilling survey and between the three survey areas (grid lines area, radials, and transect area).

Factor	Degrees of Freedom	Sum of Squares	Mean Square	F Value	p value
Soft Corals					
Survey	1	0.302	0.302	38.891	**<0.001**
Area	2	0.053	0.027	3.414	**0.034**
Survey x Area	2	0.059	0.029	3.785	**0.024**
Residuals	256	1.987	0.008		
Sea Pens					
Survey	1	0.325	0.325	124.898	**<0.001**
Area	2	0.003	0.001	0.524	0.592
Survey x Area	2	0.026	0.013	4.974	**0.008**
Residuals	256	0.666	0.003		
Notes: Bolded p-value denotes a significant result (α=0.05)					

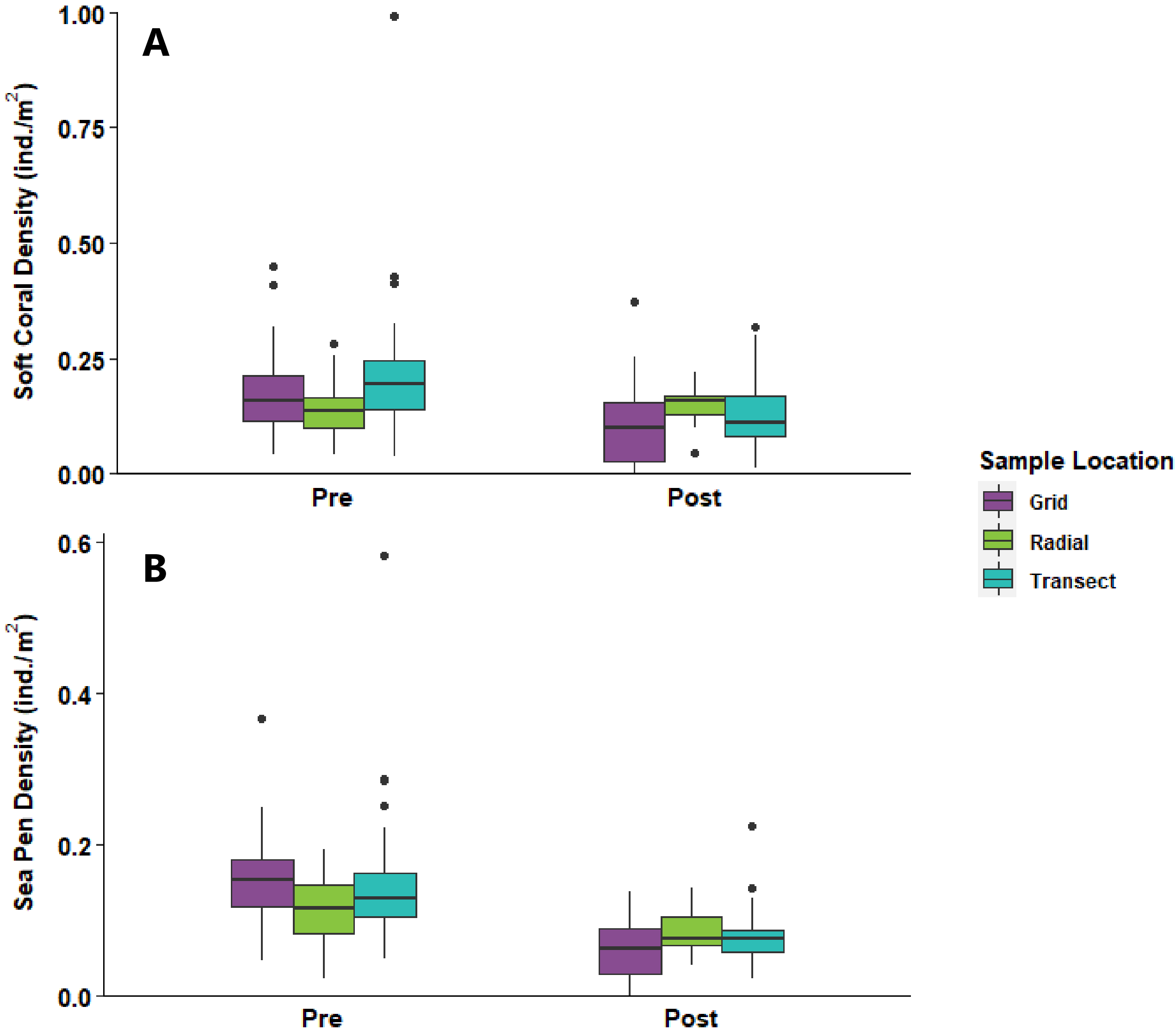

Figure 3-9 Boxplots of soft coral (A) and sea pen (B) densities from the three sampling locations during the pre- and post-drilling surveys.

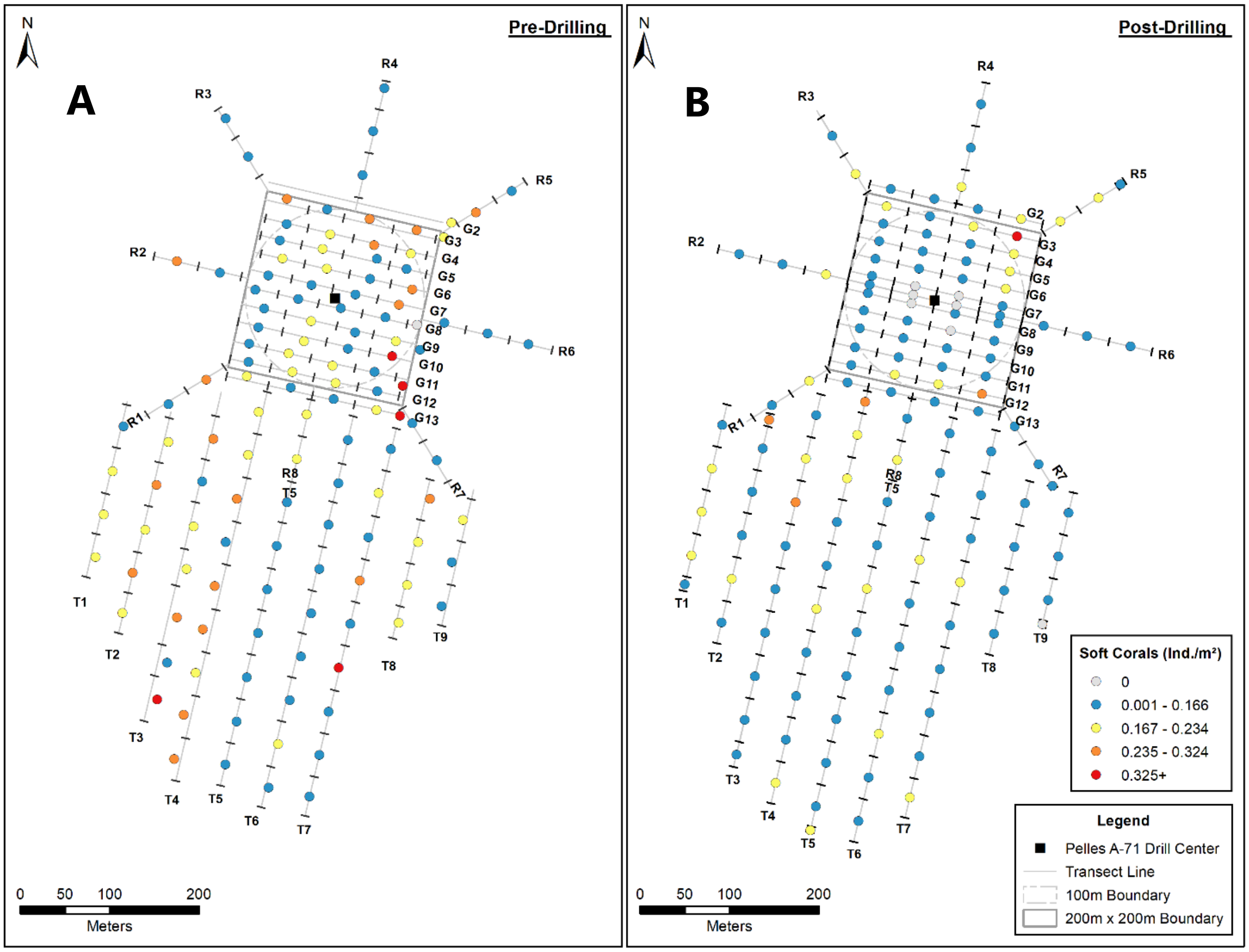

Figure 3-10 Soft coral density per transect at Pelles A-71 in pre-drilling survey (A) and in the post-drilling survey (B).

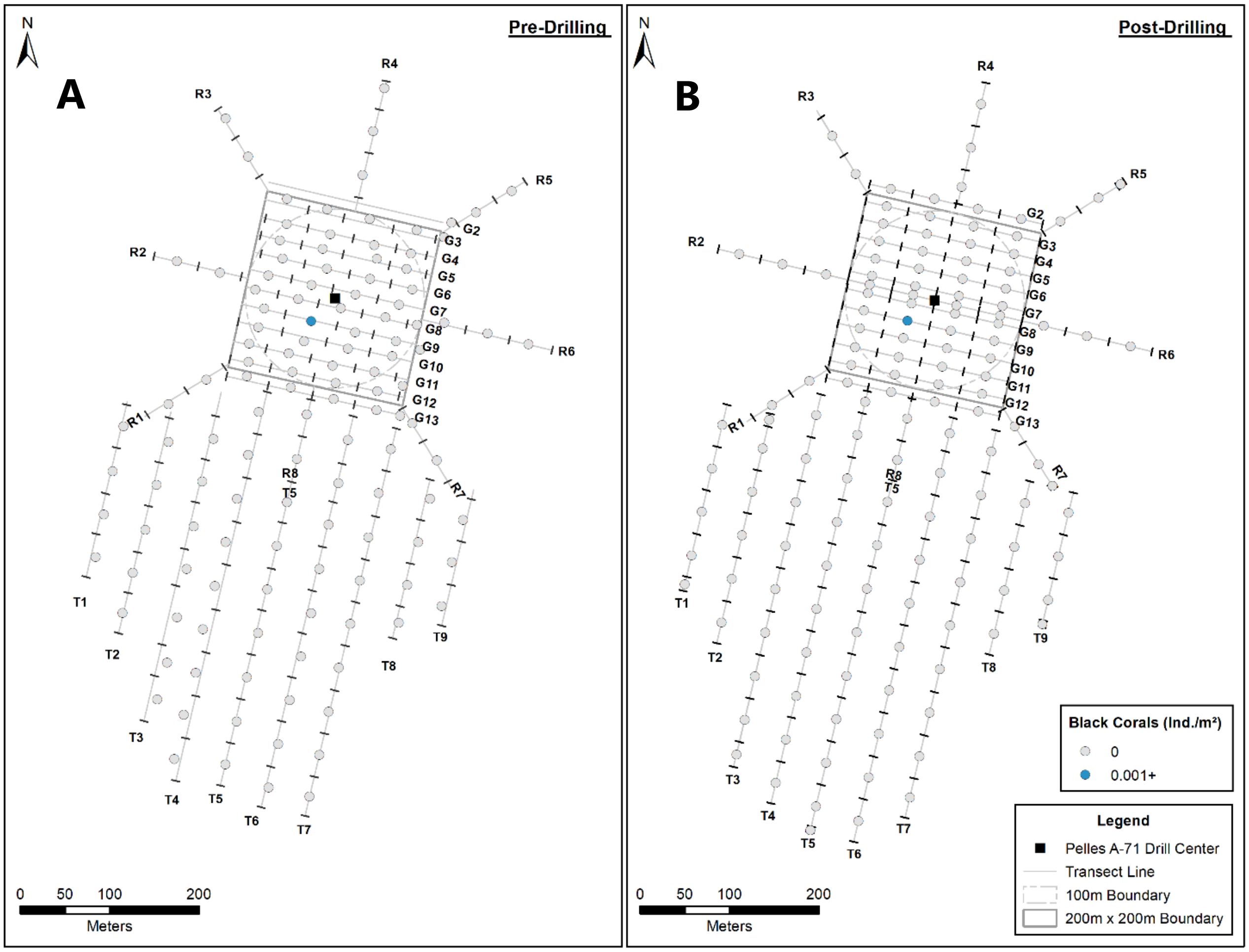

Figure 3-11 Black coral density per transect at Pelles A-71 in pre-drilling survey (A) and in the post-drilling survey (B).

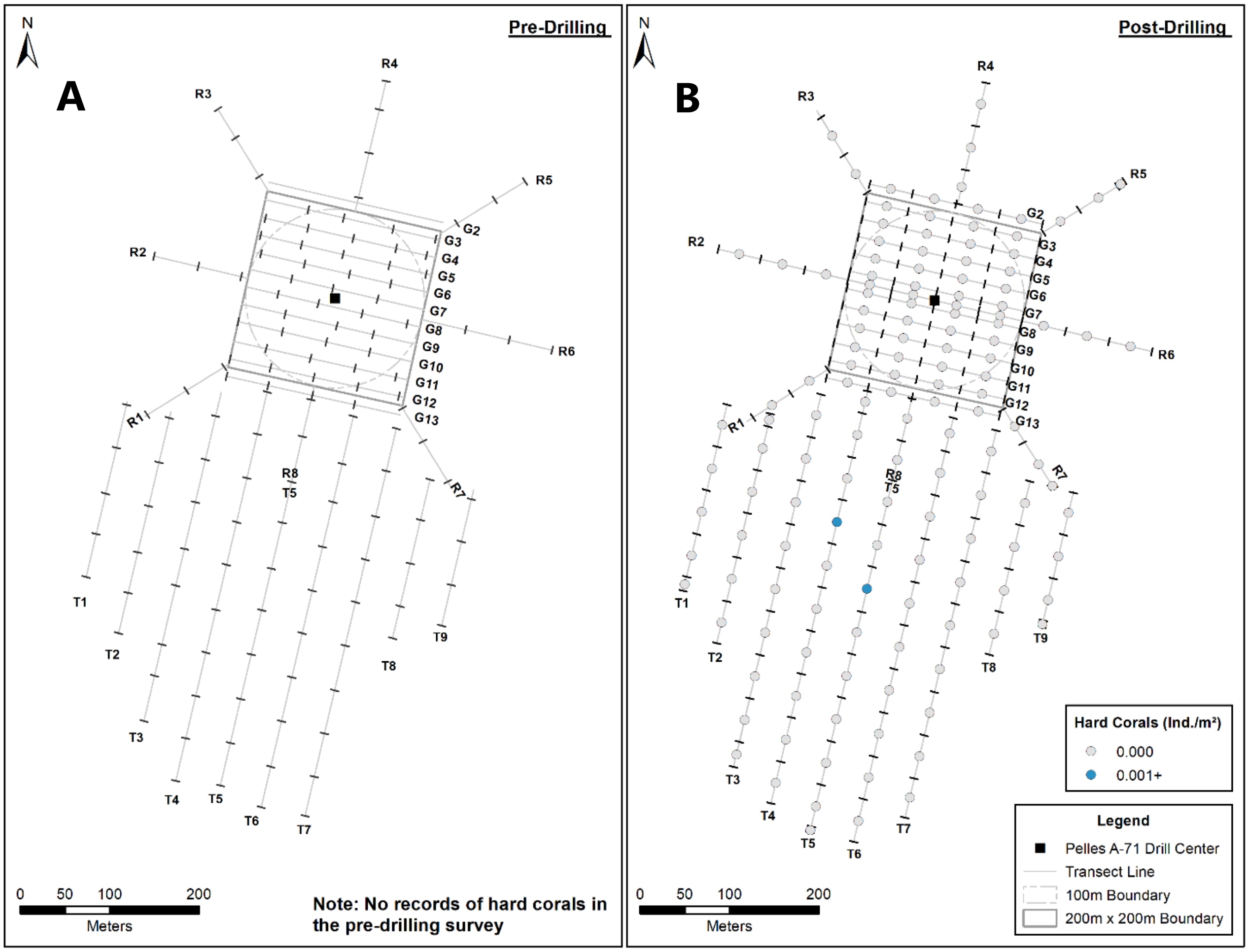

Figure 3-12 Hard coral density per transect at Pelles A-71 in pre-drilling survey (A) and in the post-drilling survey (B).

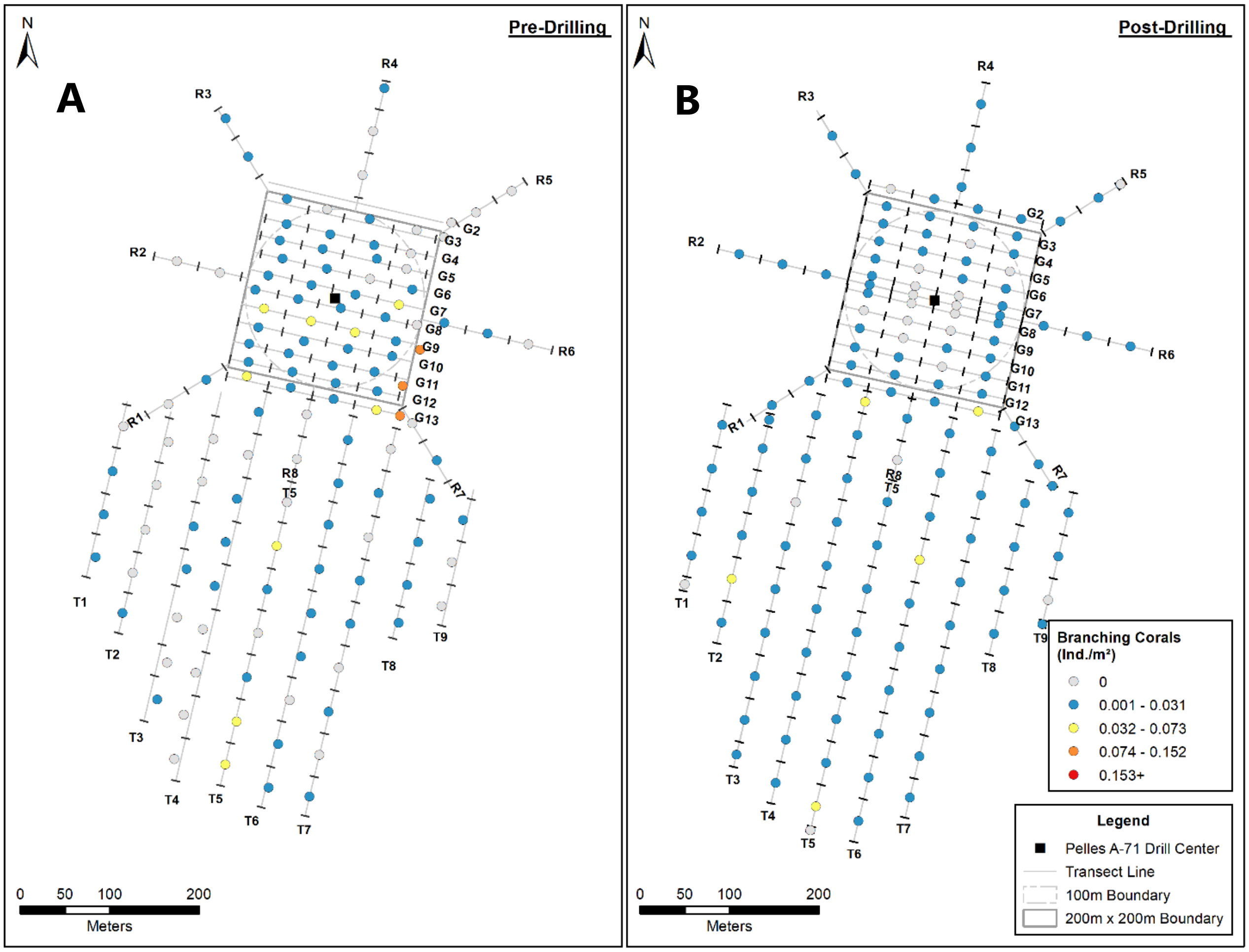

Figure 3-13 Branching coral density per transect at Pelles A-71 in pre-drilling survey (A) and in the post-drilling survey (B).

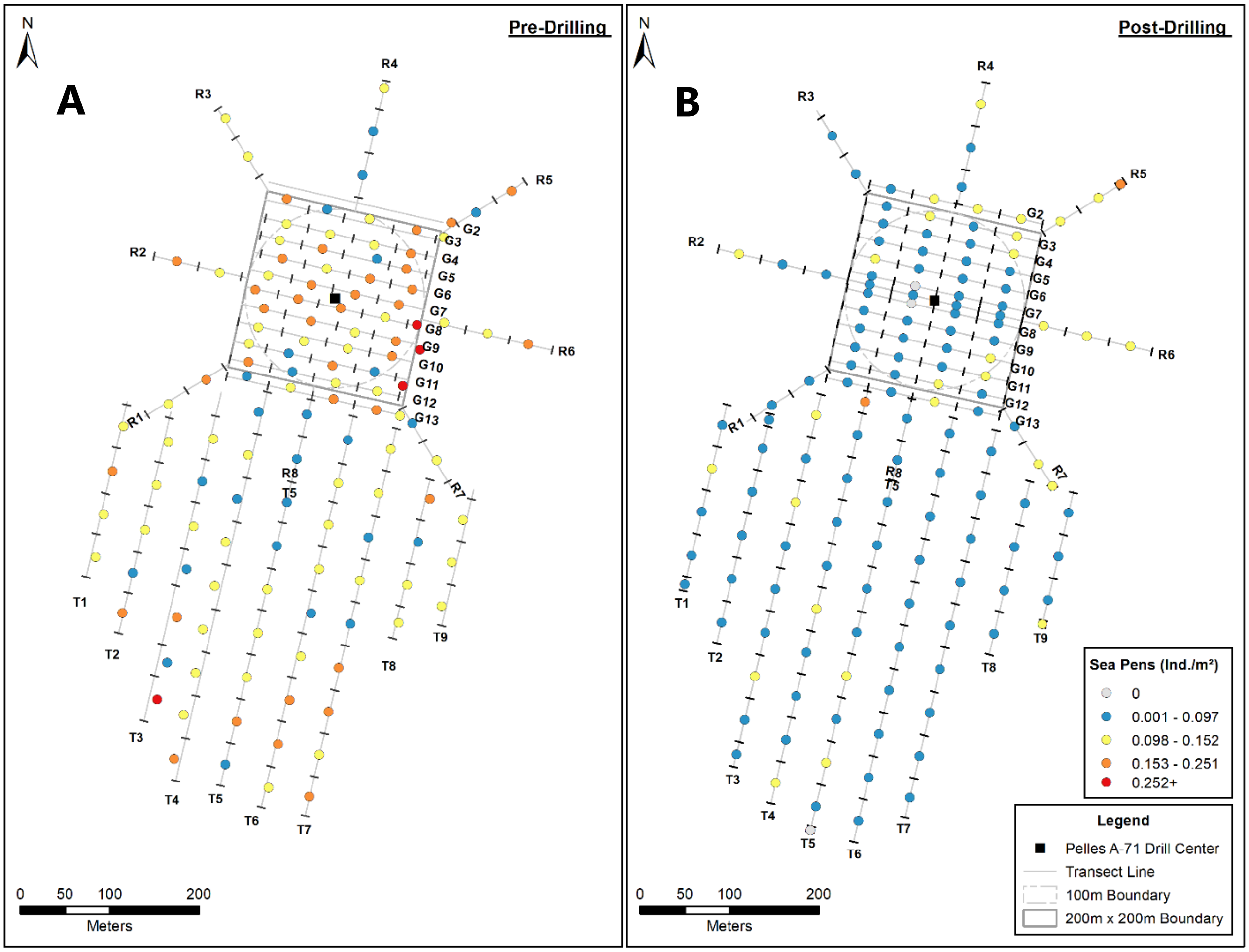

Figure 3-14 Sea pen density per transect at Pelles A-71 in pre-drilling survey (A) and in the post-drilling survey (B).

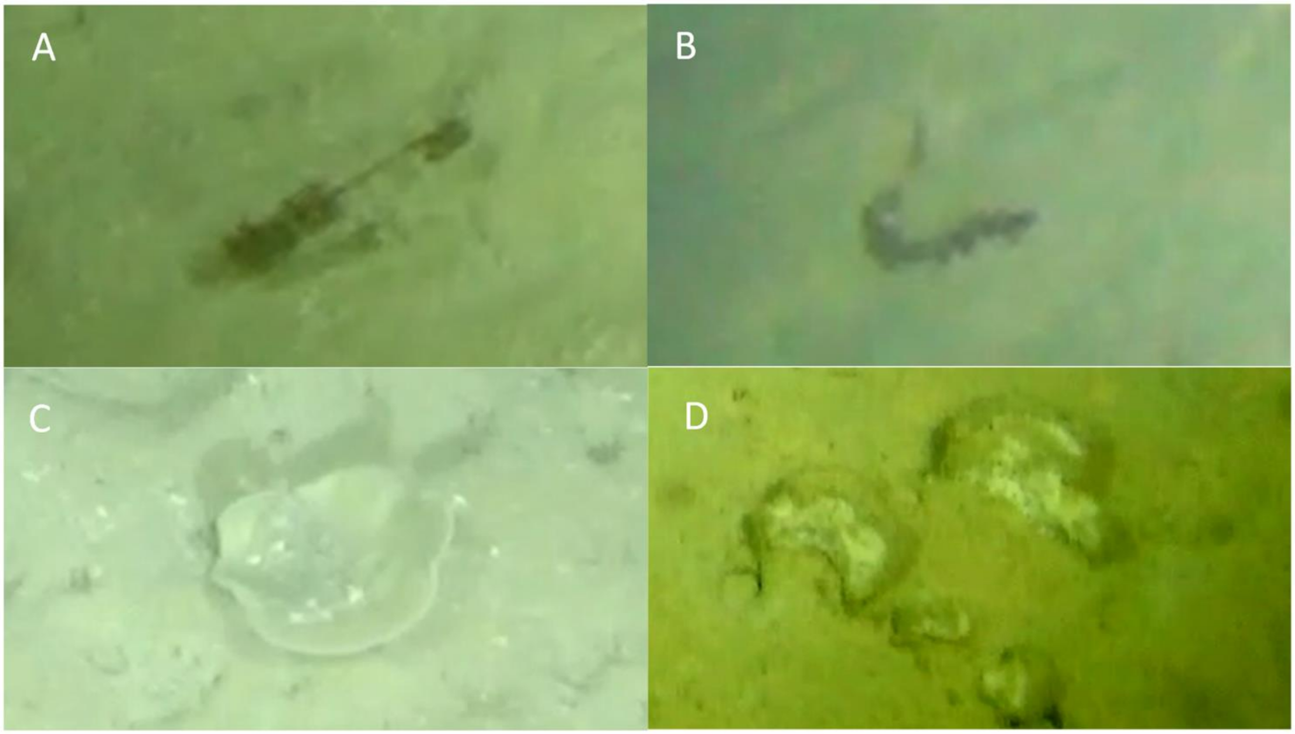

Figure 3-15 Example images of coral and sponge conditions encountered as part of the Pelles A-71 post-drilling survey: A) sea pen with <50% of polyps missing (damaged), B) sea pen laying prone on the seafloor (damaged), C) vase sponge with sedimentation and cuttings flecks (surface veneer), and D) solid / massive sponge with background sedimentation (surface veneer).

3.4.2 Sponges

In both the pre- and post-drilling survey, other sponges were the most abundant sponge group, followed by solid/massive, thin-walled/complex, leaf/vase shaped, and round with projections sponges (Figure 3-16). As sponge density in both surveys was relatively low, no statistical comparisons were made. Comparing across surveys, some sponge groups increased in density and other decreased (Table 3-5). Other sponges saw an increase in all three surveyed areas in the post-drilling survey (25% to 189% increase) (Table 3-5, Figure 3-21). Solid/massive sponges declined within the grid lines area (25% decrease) but increased in both the radials and transect areas (1.2x and 1.6x, respectively) (Table 3-5, Figure 3-17). Thin-walled, complex and leaf/vase shaped sponges declined in density across all three surveyed areas, though low numbers were recorded overall (Table 3-5, Figure 3-18, Figure 3-20). Round with projection sponges were uncommon in all surveyed areas and similar densities were recorded in both the pre- and post-drilling surveys (Figure 3-19). While all sponges were absent from the visible deposition area, many sponges were still present within the transition zone with little to no surface veneers present.

Sponge condition throughout Pelles A-71 was similar across the pre- and post-drilling surveys. During the pre-drilling survey, sponges largely had no visible surface sedimentation; however, occasional sponges had surface veneers recorded. No smothered or buried sponges were noted in the pre-drilling survey. The post-drilling survey showed similar sponge condition, with few observations of surface veneers present (Figure 3-15 C, D). No dead sponges or sponges with any amount of smothering or burial were recorded during the post-drilling survey. Some sponges were recorded with flecks of cuttings present, which differed from natural veneers in colour and shape (see Figure 3-15 C for flecks of cuttings, and Figure 3-15 D for background veneer (line R4)).

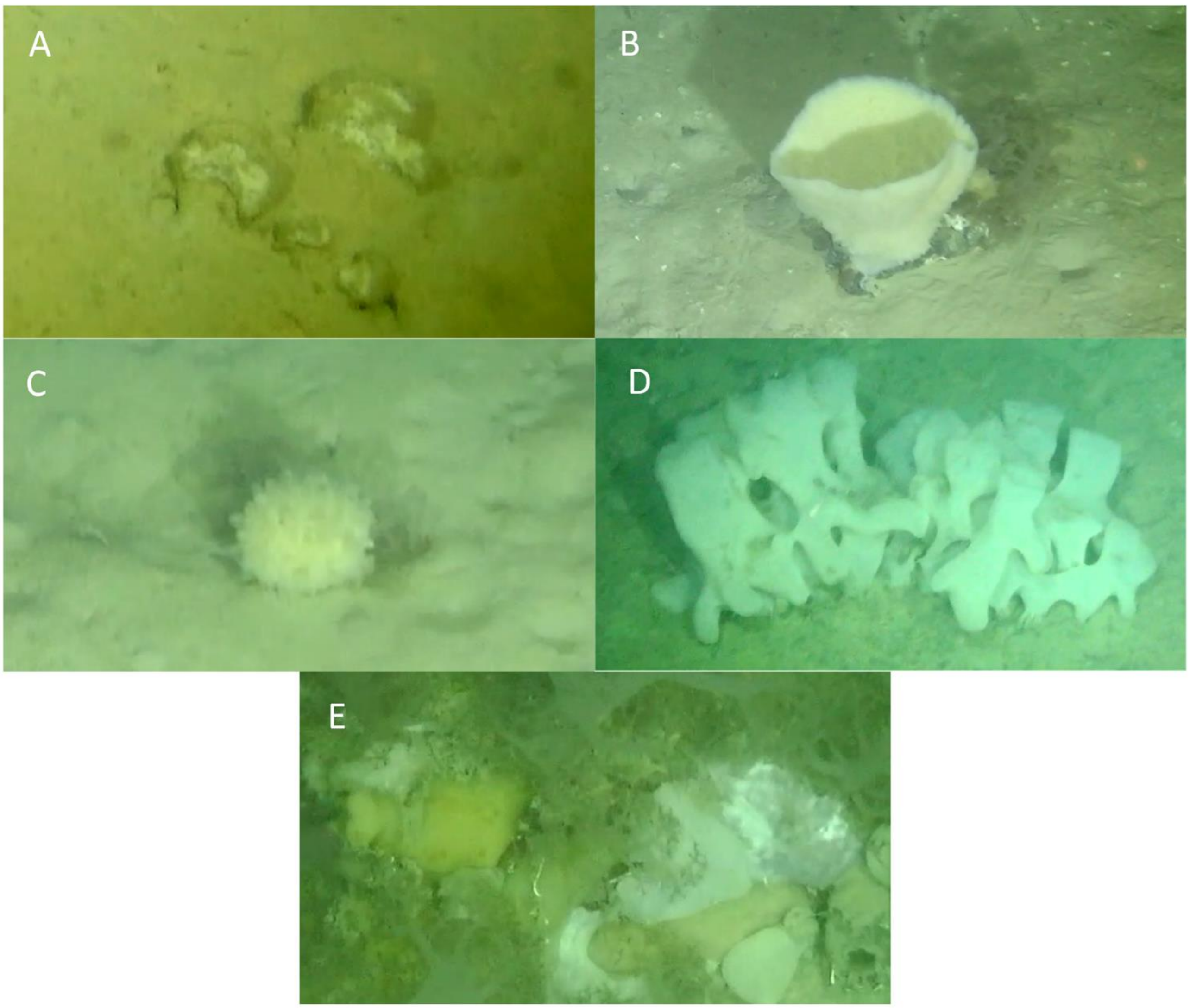

Figure 3-16 Example images of sponge groups encountered as part of the Pelles A-71 post-drilling survey: A) geodid sponge with veneer (solid / massive), B) vase sponge (leaf / vase shaped), C) polymastid sponge (round with projections), D) glass sponge (thin-walled, complex), and E) encrusting sponge (other sponge).

Table 3-5 Sponge group density summary across areas during pre-drilling (2019) and post-drilling (2021) surveys.

Taxa Group	Area	Year	Density (ind/m²)				
			Mean	St.Dev.	Median	Min*	Max
Solid / Massive	Grid Lines	2019	0.008	0.010	0.007	0.007	0.041
		2021	0.006	0.009	0.004	0.004	0.042
	Radials	2019	0.008	0.008	0.007	0.007	0.028
		2021	0.021	0.042	0.007	0.004	0.169
	Transect Area	2019	0.012	0.018	0.007	0.007	0.086
		2021	0.026	0.035	0.011	0.004	0.159
Leaf / Vase Shaped	Grid Lines	2019	0.002	0.004	0	0.007	0.014
		2021	0.001	0.003	0	0.004	0.011
	Radials	2019	0.007	0.006	0.007	0.007	0.021
		2021	0.002	0.003	0.004	0.004	0.007
	Transect Area	2019	0.006	0.007	0.003	0.007	0.028
		2021	0.003	0.003	0	0.004	0.014
Round with Projections	Grid Lines	2019	<0.001	0.002	0	0.007	0.007
		2021	<0.001	0.001	0	0.004	0.004
	Radials	2019	0.001	0.002	0	0.007	0.007
		2021	0.001	0.002	0	0.004	0.007
	Transect Area	2019	<0.001	0.001	0	0.007	0.007
		2021	0.001	0.001	0	0.004	0.007
Thin-Walled, Complex	Grid Lines	2019	0.003	0.004	0	0.007	0.014
		2021	0.001	0.002	0	0.004	0.007
	Radials	2019	0.008	0.006	0.007	0.007	0.014
		2021	0.004	0.004	0.004	0.004	0.014
	Transect Area	2019	0.004	0.006	0	0.007	0.021
		2021	0.002	0.003	0	0.004	0.014
Other Sponge	Grid Lines	2019	0.010	0.009	0.007	0.003	0.034
		2021	0.019	0.022	0.012	0.004	0.088
	Radials	2019	0.009	0.007	0.007	0.007	0.021
		2021	0.026	0.019	0.021	0.007	0.053
	Transect Area	2019	0.012	0.017	0.007	0.007	0.129
		2021	0.015	0.015	0.011	0.004	0.057

Notes:
Only sections above 10 m linear distance were included for summary statistics
*Min is the smallest non-zero density value

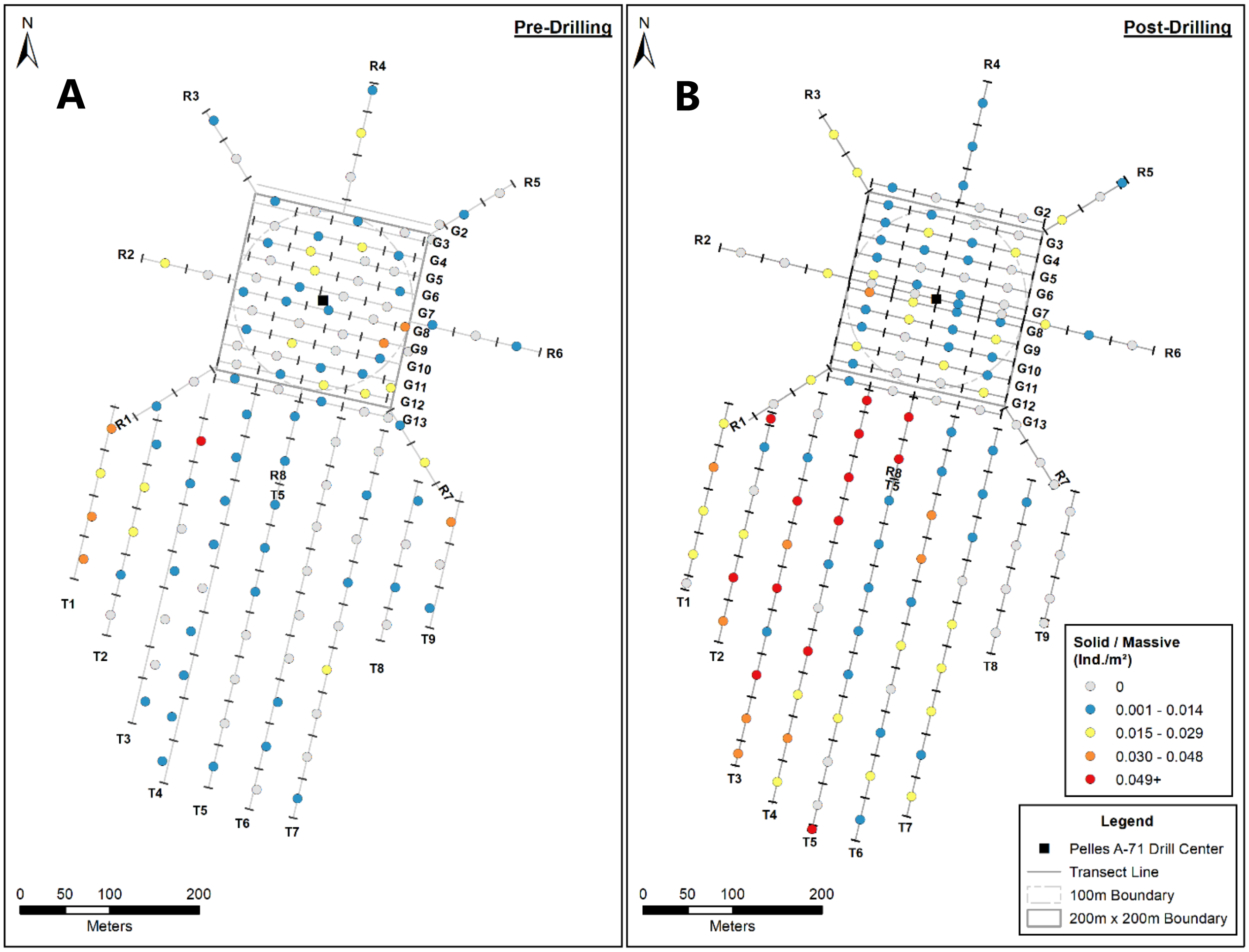

Figure 3-17 Solid / massive sponge density per transect at Pelles A-71 in pre-drilling survey (A) and in the post-drilling survey (B).

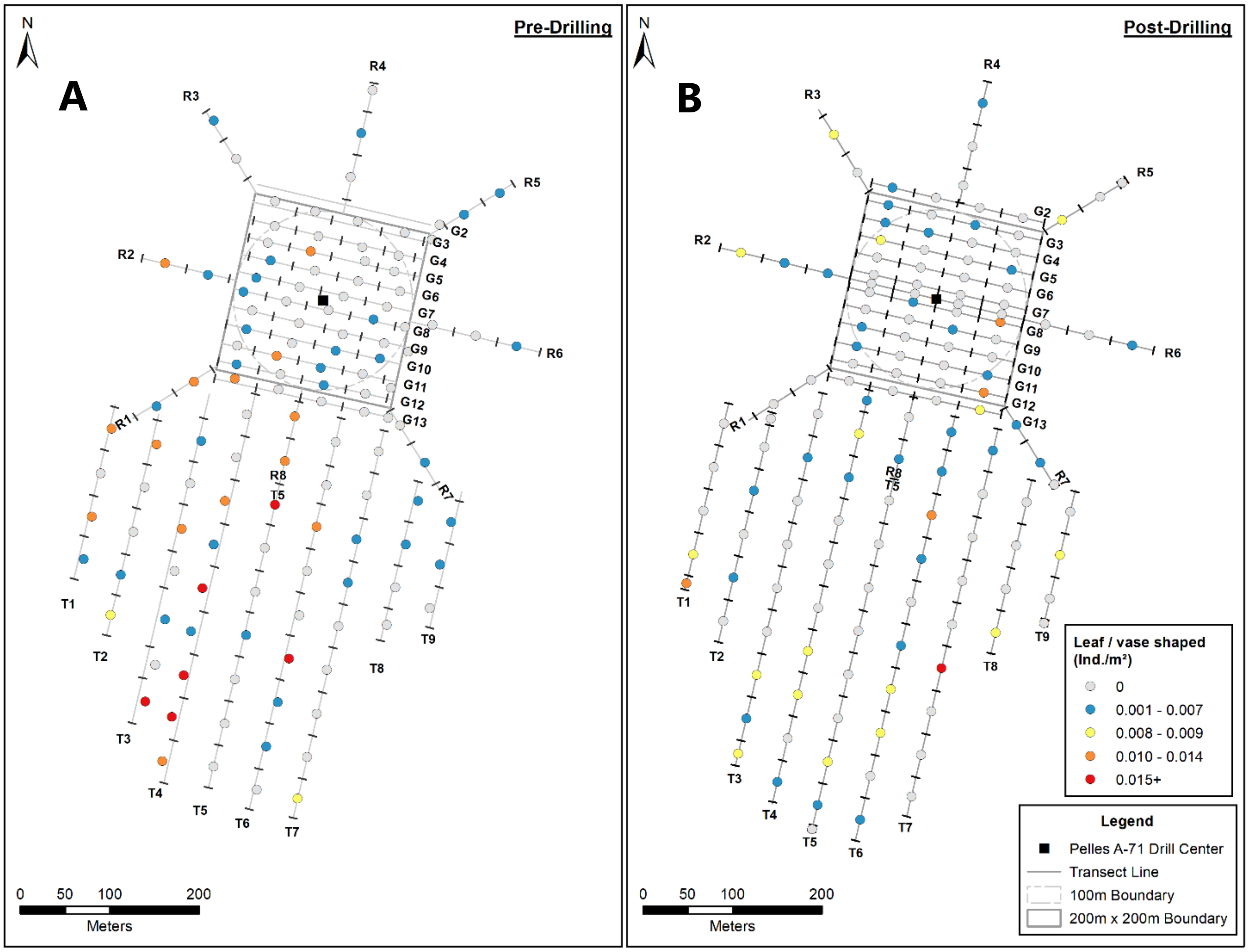

Figure 3-18 Leaf / vase shaped sponge density per transect at Pelles A-71 in pre-drilling survey (A) and in the post-drilling survey (B).

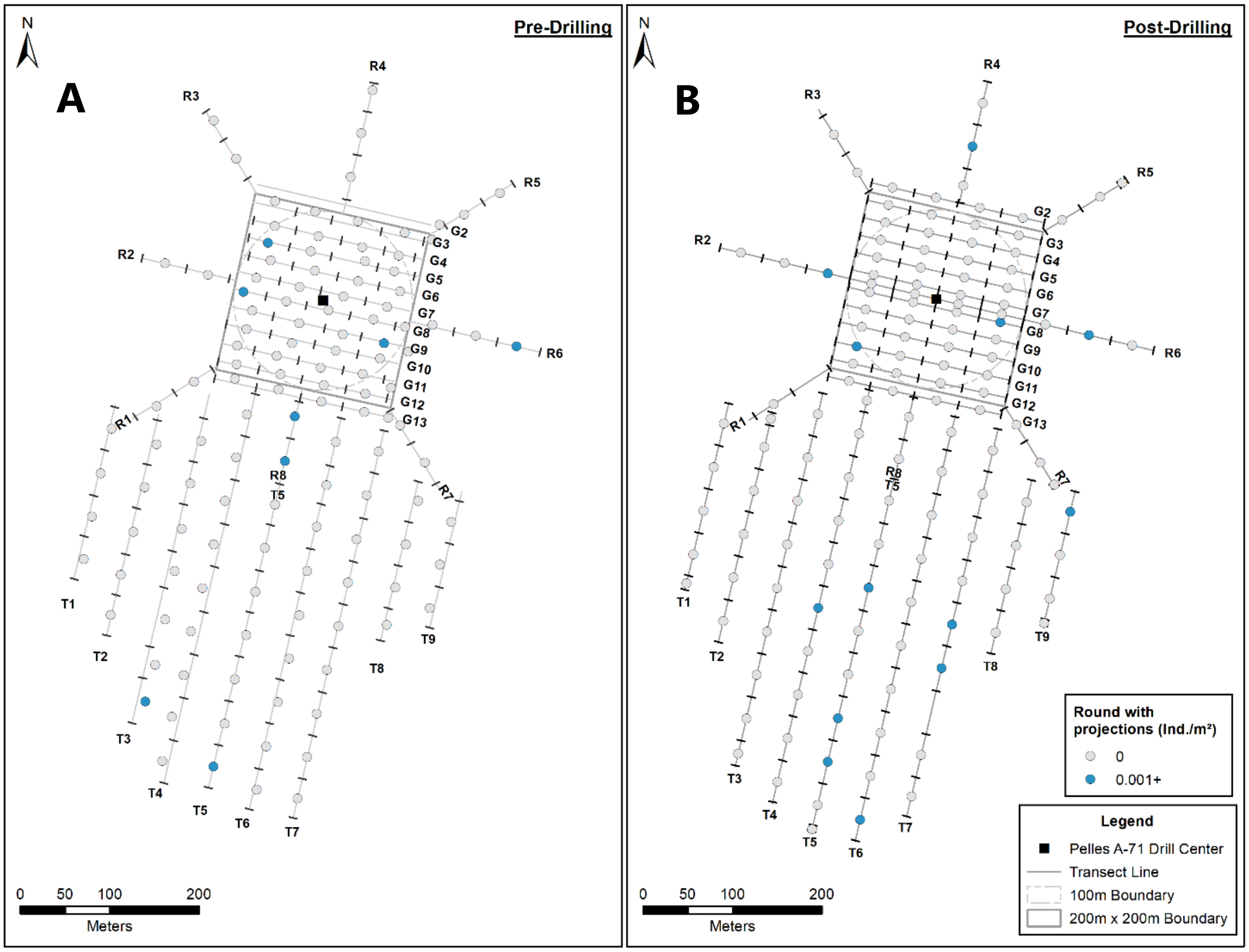

Figure 3-19 Round with projections sponge density per transect at Pelles A-71 in pre-drilling survey (A) and in the post-drilling survey (B).

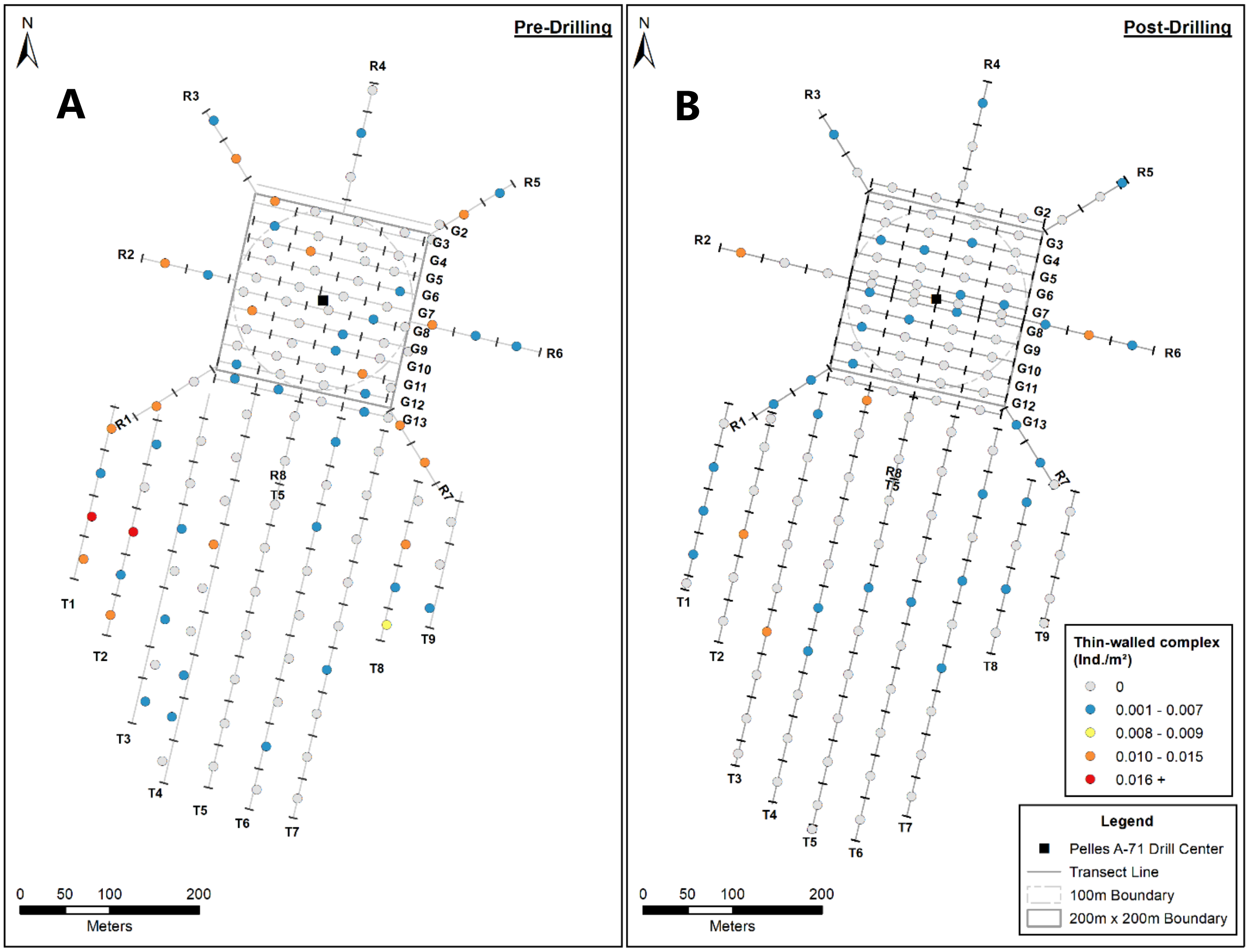

Figure 3-20 Thin-walled, complex sponge density per transect at Pelles A-71 in pre-drilling survey (A) and in the post-drilling survey (B).

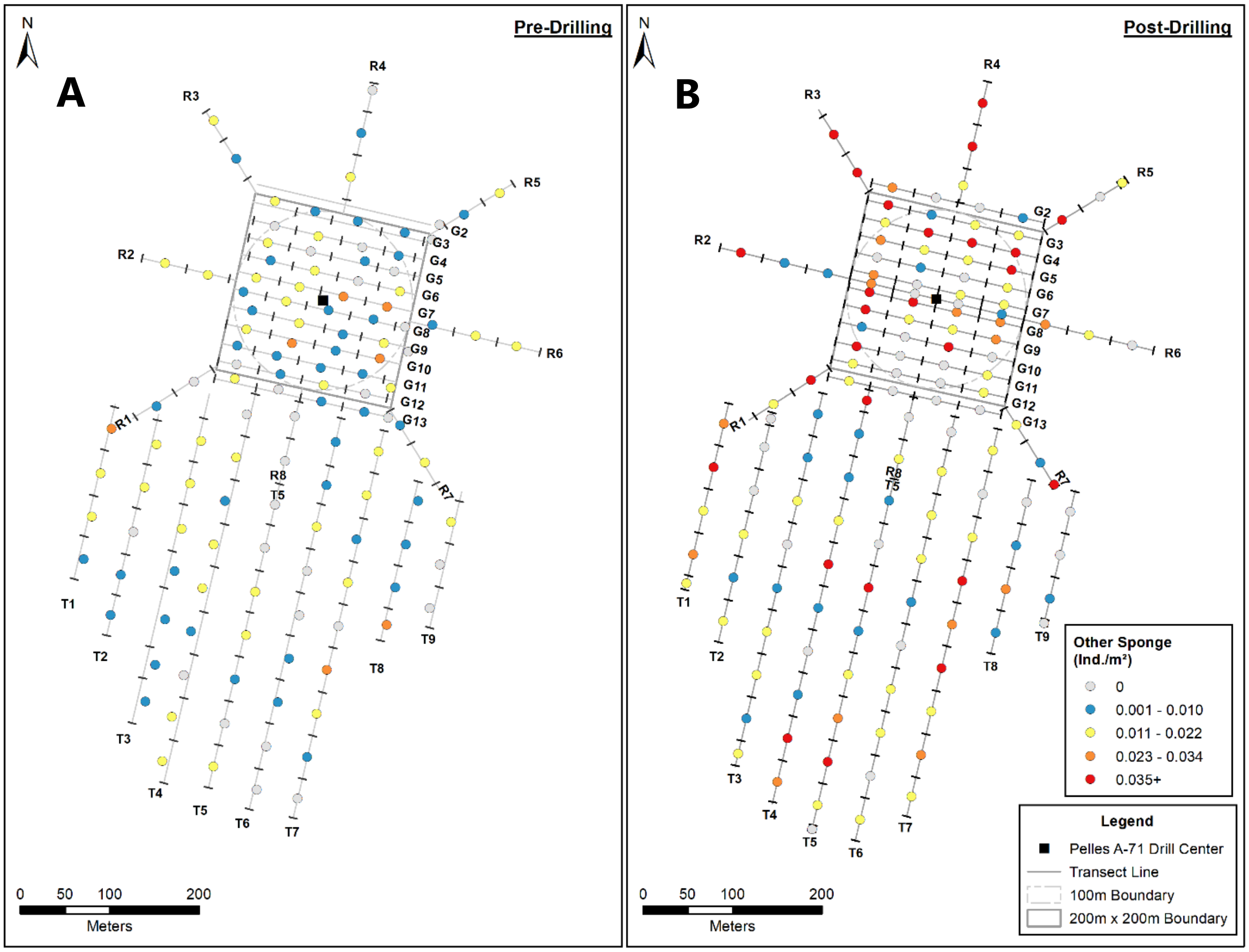

Figure 3-21 Other sponge density per transect at Pelles A-71 in pre-drilling survey (A) and in the post-drilling survey (B).

3.4.3 Invertebrates

In the pre-drilling survey, the most abundant group of non-coral or sponge invertebrates was echinoderms, followed by cnidarians, brachiopods, other invertebrates, and molluscs. The post-drilling survey had a similar trend, though other invertebrates were more abundant than brachiopods (Figure 3-22). Comparing across surveys, echinoderm, cnidarian, and brachiopod densities all decreased from 2019 to 2021 (with the exception of cnidarians within radials), with larger decreases within the grid lines area (Table 3-6, Figure 3-23, Figure 3-24, Figure 3-25, Figure 3-27). A two-way ANOVA for echinoderm density across surveys and areas found significant differences between surveys (p=0.001) and the interaction term (p=0.001), but not between areas (Table 3-7, Figure 3-23). Few molluscs were recorded overall and did not vary much between surveys (Table 3-6, Figure 3-26). Other invertebrates did not vary in the grid lines and radials between surveys, but a large change was noted for the transect area with a 4.5x higher average density in 2021 (Table 3-6, Figure 3-28). This change is driven by large numbers of pelagic shrimp recorded in several transect area lines in the post-drilling survey (Figure 3-28).

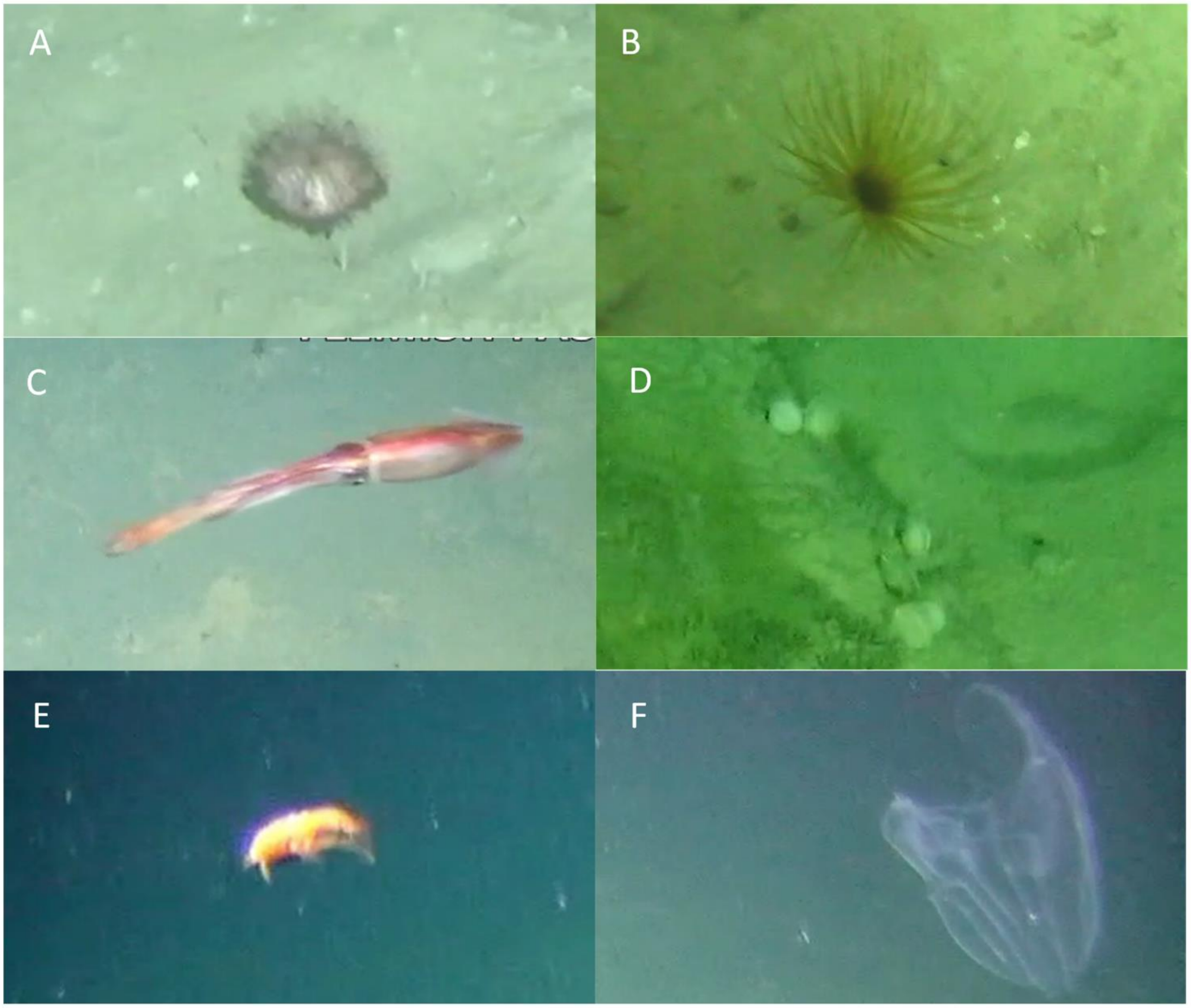

Figure 3-22 Example images of invertebrates encountered as part of the Pelles A-71 post-drilling survey: A) *Phormosoma* sp. sea urchin (echinoderm), B) cerianthid sea anemone (cnidarian), C) squid (mollusc), D) brachiopods (brachiopod), E) shrimp (other), and F) ctenophore (other).

Table 3-6 Invertebrate density summary across areas during pre-drilling (2019) and post-drilling (2021) surveys.

Taxa Group	Area	Year	Density (ind/m²)				
			Mean	St.Dev.	Median	Min*	Max
Echinoderms	Grid Lines	2019	0.085	0.042	0.090	0.017	0.194
		2021	0.036	0.023	0.035	0.004	0.088
	Radials	2019	0.073	0.029	0.072	0.034	0.152
		2021	0.068	0.015	0.071	0.028	0.092
	Transect Area	2019	0.076	0.040	0.069	0.014	0.259
		2021	0.061	0.016	0.060	0.031	0.127
Cnidarians	Grid Lines	2019	0.046	0.026	0.048	0.007	0.106
		2021	0.027	0.018	0.023	0.004	0.078
	Radials	2019	0.045	0.027	0.041	0.007	0.103
		2021	0.054	0.028	0.050	0.014	0.115
	Transect Area	2019	0.088	0.056	0.083	0.021	0.409
		2021	0.057	0.035	0.053	0.011	0.159
Molluscs	Grid Lines	2019	0.007	0.011	0.003	0.003	0.048
		2021	0.003	0.004	0.002	0.004	0.014
	Radials	2019	0.001	0.003	0	0.007	0.007
		2021	0.003	0.004	0.004	0.004	0.011
	Transect Area	2019	0.001	0.002	0	0.007	0.009
		2021	0.004	0.006	0	0.004	0.021
Brachiopods	Grid Lines	2019	0.026	0.051	0	0.014	0.216
		2021	0.001	0.007	0	0.028	0.042
	Radials	2019	0.018	0.022	0.007	0.014	0.069
		2021	0.010	0.013	0	0.018	0.035
	Transect Area	2019	0.012	0.030	0	0.028	0.138
		2021	0.003	0.008	0	0.004	0.042
Other Invertebrates	Grid Lines	2019	0.004	0.008	0	0.003	0.041
		2021	0.004	0.004	0.004	0.004	0.014
	Radials	2019	0.006	0.007	0.003	0.007	0.021
		2021	0.005	0.006	0.004	0.004	0.021
	Transect Area	2019	0.004	0.012	0	0.007	0.086
		2021	0.022	0.025	0.014	0.004	0.117

Notes:
Only sections above 10 m linear distance were included for summary statistics
*Min is the smallest non-zero density value

Table 3-7 Two-way ANOVA comparison of echinoderm density between the pre- and post-drilling survey and between the three survey areas (grid lines area, radials, and transect area).

Factor	Degrees of Freedom	Sum of Squares	Mean Square	F Value	p value
Echinoderms					
Survey	1	0.047	0.047	49.113	**<0.001**
Area	2	0.005	0.003	2.625	0.074
Survey x Area	2	0.021	0.010	10.892	**<0.001**
Residuals	256	0.245	0.001		
Notes: Bolded p-value denotes a significant result (α=0.05)					

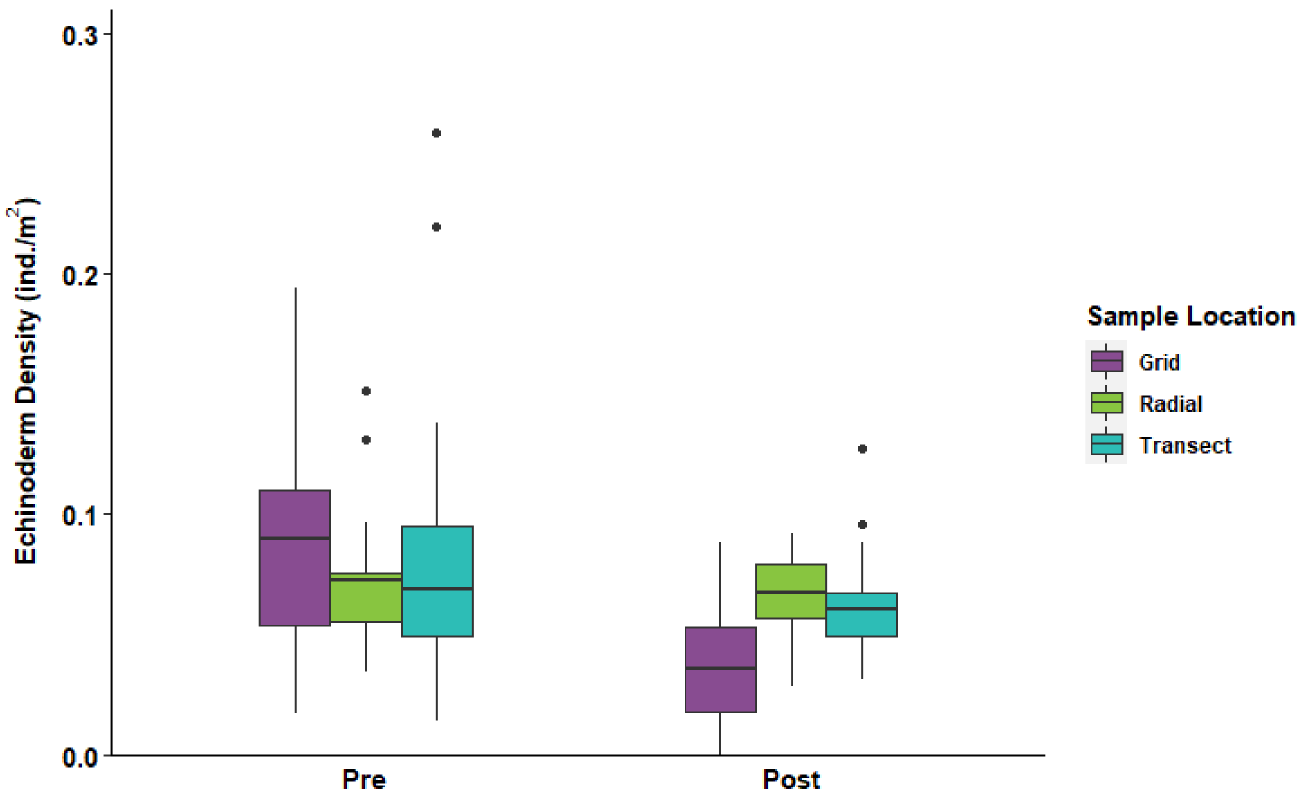

Figure 3-23 Boxplots of echinoderm density from the three sampling locations during the pre- and post-drilling surveys.

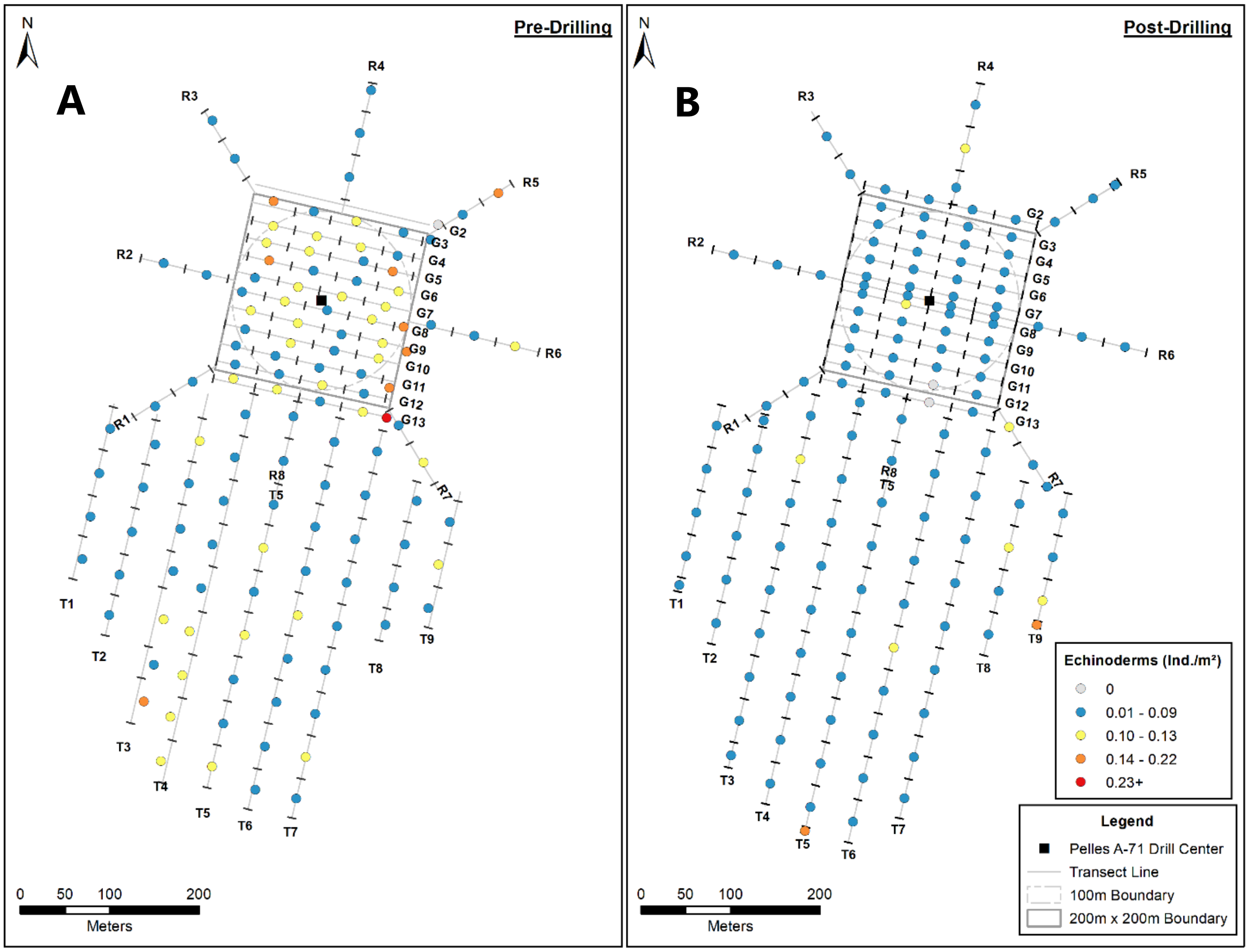

Figure 3-24 Echinoderm density per transect at Pelles A-71 in pre-drilling survey (A) and in the post-drilling survey (B).

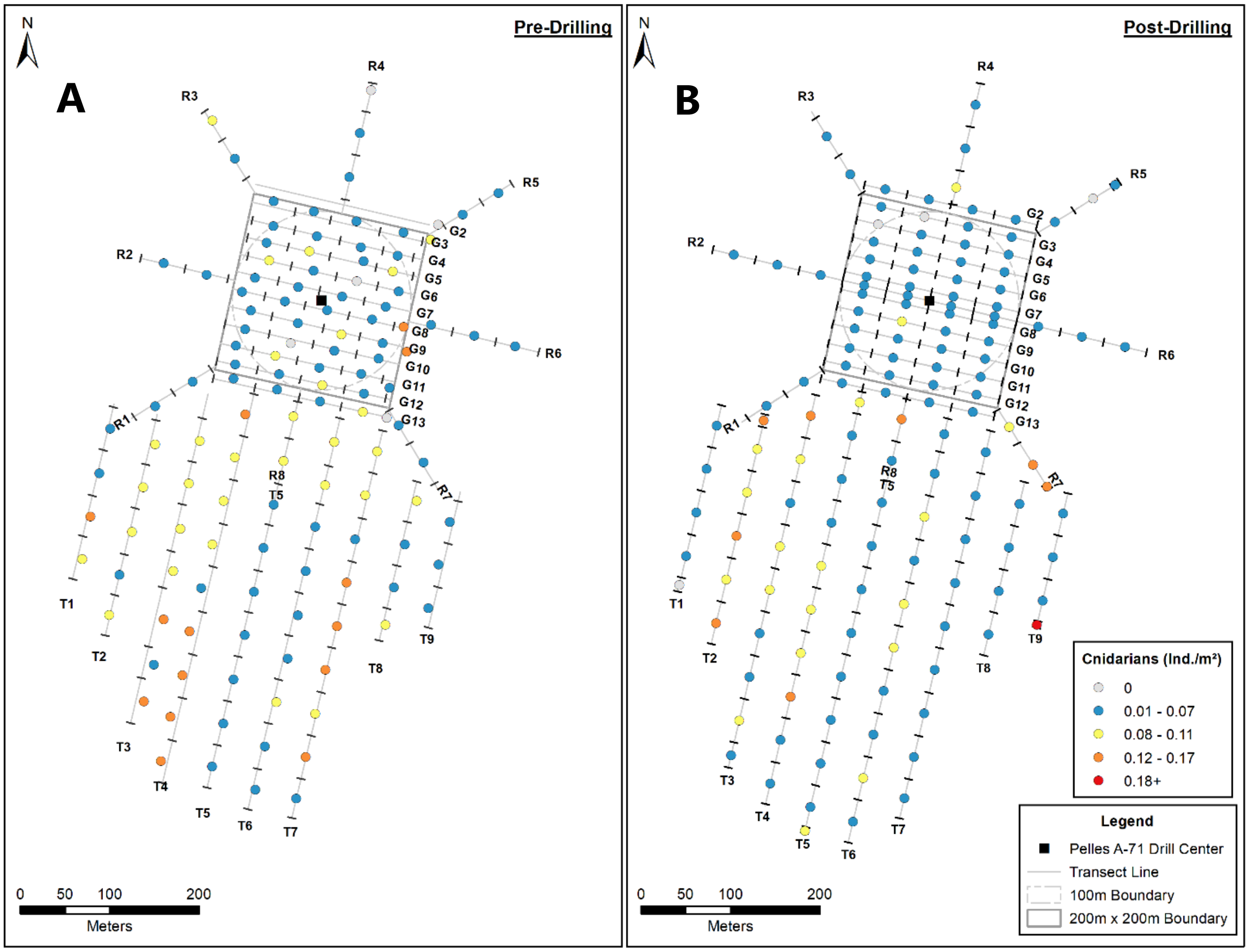

Figure 3-25 Cnidarian density per transect at Pelles A-71 in pre-drilling survey (A) and in the post-drilling survey (B).

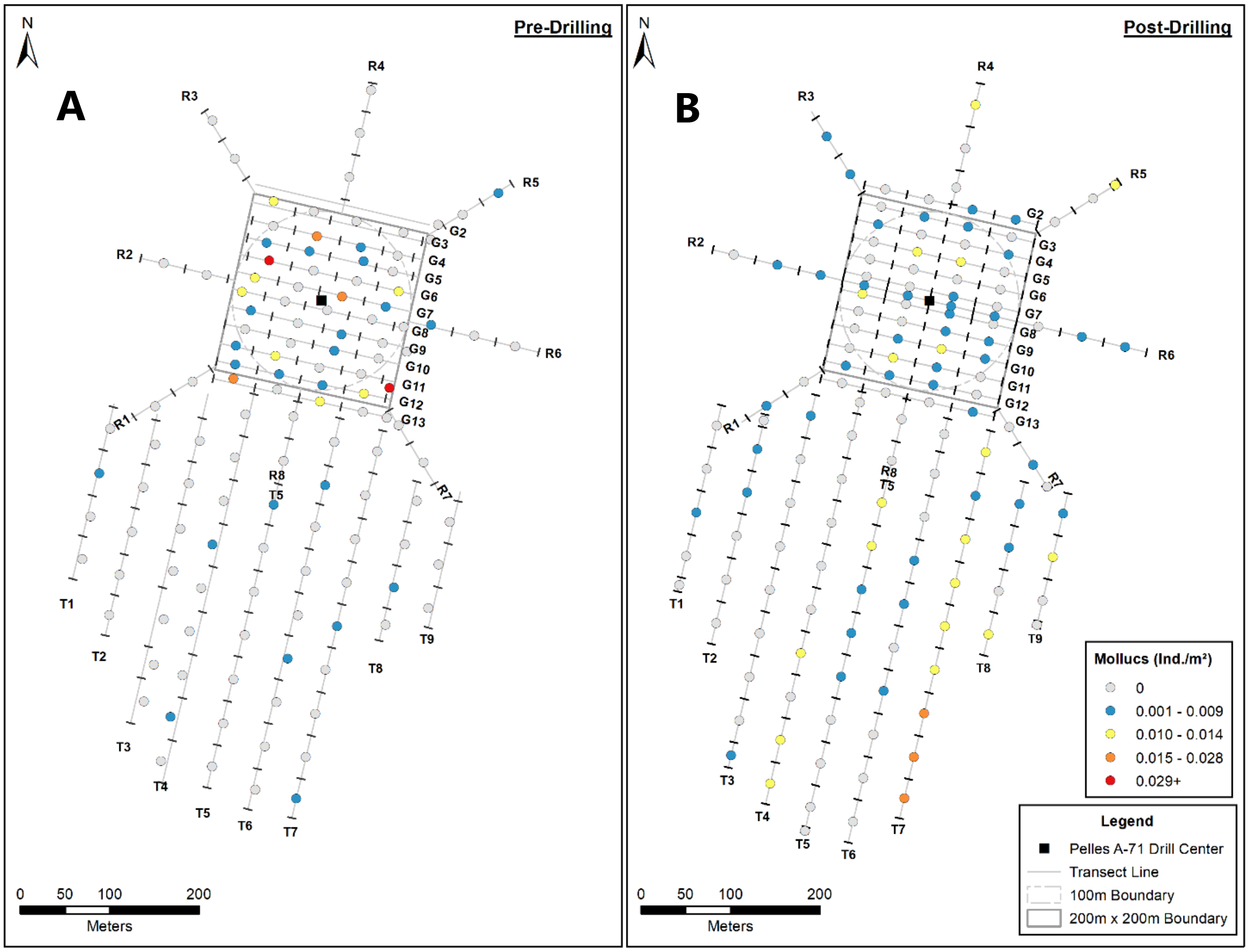

Figure 3-26 Mollusc density per transect at Pelles A-71 in pre-drilling survey (A) and in the post-drilling survey (B).

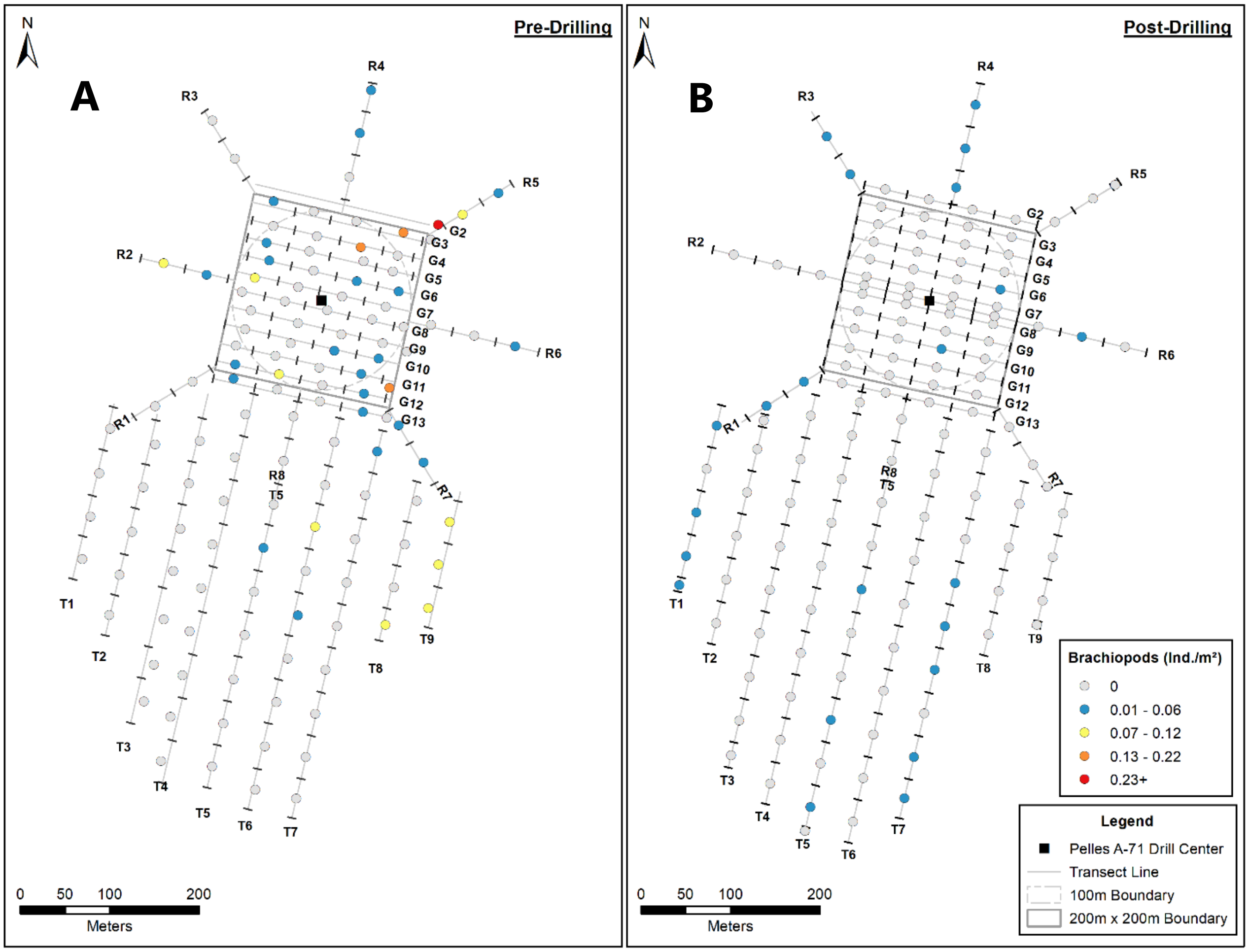

Figure 3-27 Brachiopod density per transect at Pelles A-71 in pre-drilling survey (A) and in the post-drilling survey (B).

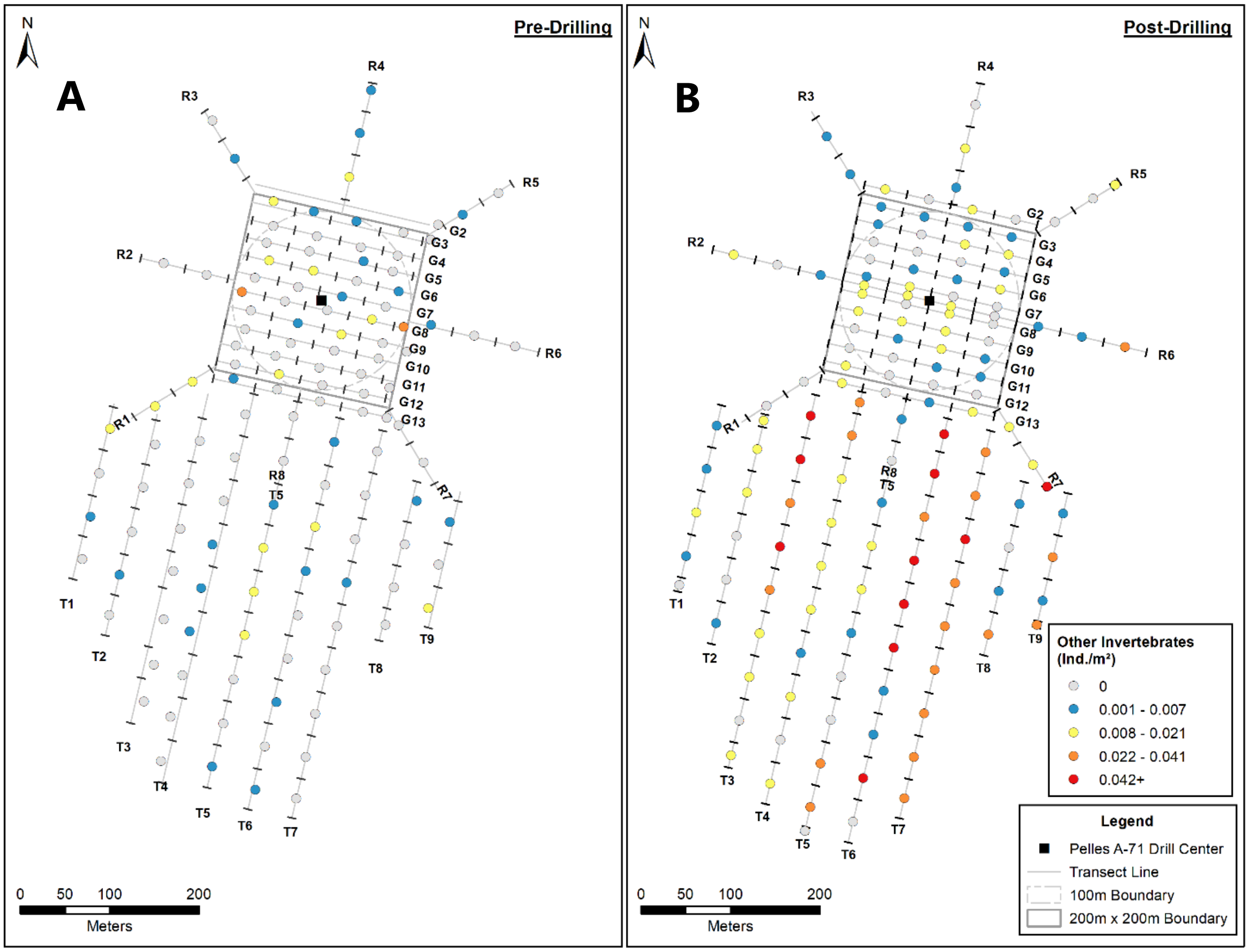

Figure 3-28 Other invertebrate density per transect at Pelles A-71 in pre-drilling survey (A) and in the post-drilling survey (B).

3.4.4 Fish

For the pre-drilling survey, the most abundant group of fish were the benthivores, followed by unidentified fish, planktivores, and piscivores. For the post-drilling survey, the same abundance trends were recorded (Figure 3-29). Comparing between surveys, an overall decline (54% to 66% decrease) was noted for benthivores (Table 3-8, Figure 3-30). Benthivores were recorded within the visible deposition area near the well head (Figure 3-30). Few piscivores and planktivores were recorded overall, with generally no change between surveys (Table 3-8, Figure 3-31, Figure 3-32). Unidentified fish were similar, with the exception of the transect area lines which had a 17x increase in the post-drilling survey (Table 3-8, Figure 3-33). This increase is due to large numbers of unidentified, likely juvenile, fish present throughout the transect area lines in the post-drilling survey (Figure 3-29, Figure 3-33).

One Species at Risk Act (SARA) schedule 1 listed species was observed during the post-drilling survey: the Atlantic (or stripped) wolffish. One individual was recorded on line R6, near the well centre over the visible deposition cuttings area (Figure 3-29 C).

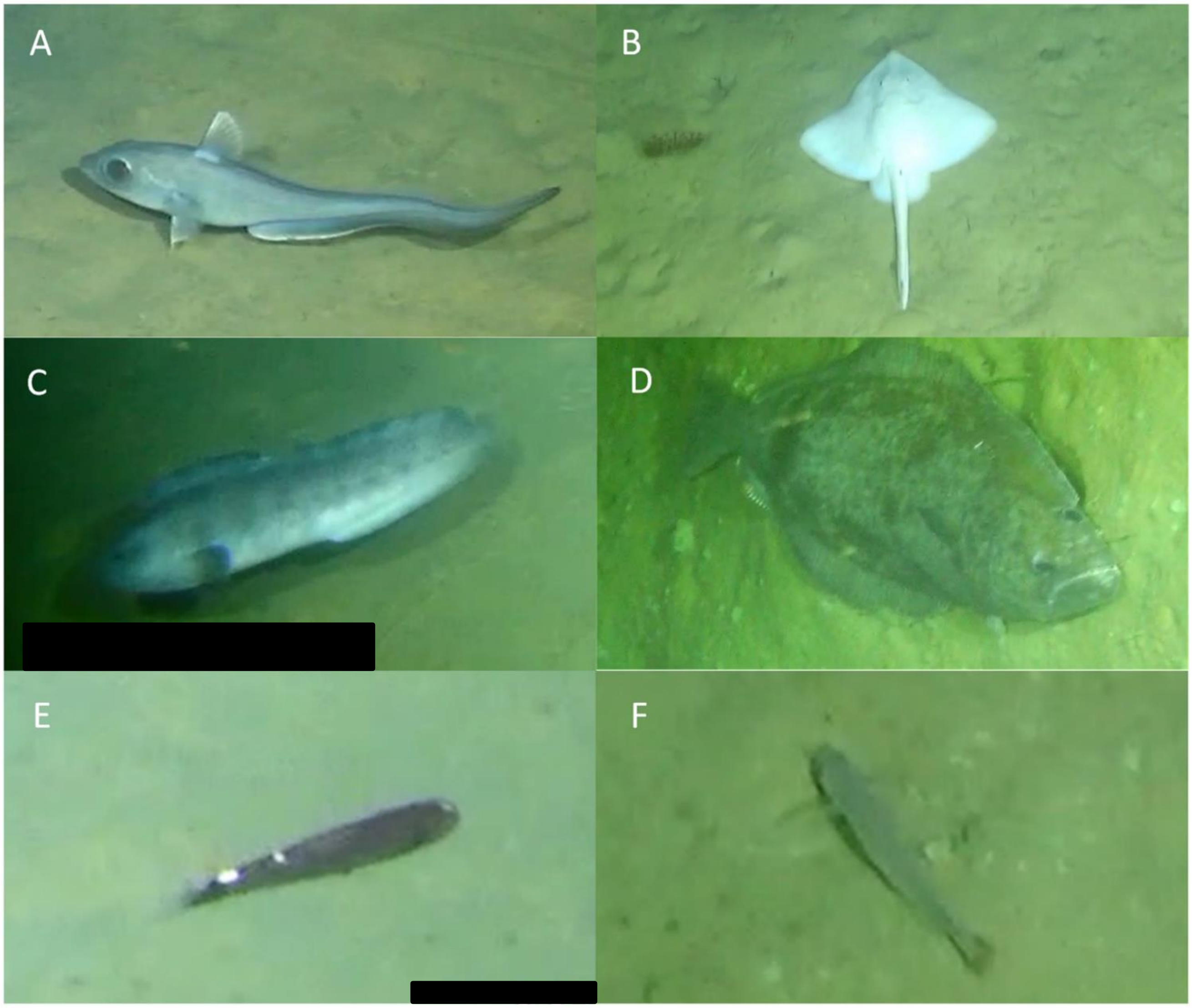

Figure 3-29 Example images of fish encountered as part of the Pelles A-71 post-drilling survey: A) grenadier (benthivore), B) skate (benthivore), C) Atlantic wolffish (benthivore), D) Greenland halibut (piscivore), E) lanternfish (planktivore), and F) unidentified fish.

Table 3-8 Finfish density summary across areas during pre-drilling (2019) and post-drilling (2021) surveys.

Taxa Group	Area	Year	Density (ind/m²)				
			Mean	St.Dev.	Median	Min*	Max
Benthivores	Grid Lines	2019	0.025	0.024	0.021	0.003	0.117
		2021	0.010	0.006	0.011	0.004	0.028
	Radials	2019	0.024	0.015	0.021	0.007	0.055
		2021	0.011	0.008	0.011	0.004	0.028
	Transect Area	2019	0.035	0.032	0.028	0.007	0.237
		2021	0.012	0.008	0.011	0.004	0.035
Piscivores	Grid Lines	2019	<0.001	0.002	0	0.007	0.014
		2021	<0.001	0.001	0	0.004	0.004
	Radials	2019	0.001	0.002	0	0.007	0.007
		2021	0	0	0	0	0
	Transect Area	2019	<0.001	0.002	0	0.007	0.007
		2021	0.001	0.002	0	0.004	0.014
Planktivores	Grid Lines	2019	0.002	0.004	0	0.007	0.014
		2021	0.003	0.004	0.004	0.004	0.014
	Radials	2019	0.005	0.007	0	0.007	0.021
		2021	0.003	0.004	0.004	0.004	0.014
	Transect Area	2019	0.001	0.002	0	0.007	0.007
		2021	0.002	0.003	0.000	0.004	0.011
Unidentified	Grid Lines	2019	0.007	0.011	0	0.007	0.049
		2021	0.004	0.004	0.004	0.004	0.018
	Radials	2019	0.006	0.009	0.003	0.007	0.034
		2021	0.005	0.006	0.004	0.004	0.023
	Transect Area	2019	0.005	0.009	0	0.007	0.034
		2021	0.091	0.096	0.064	0.004	0.471

Notes:
Only sections above 10 m linear distance were included for summary statistics
* Min is the smallest non-zero density value

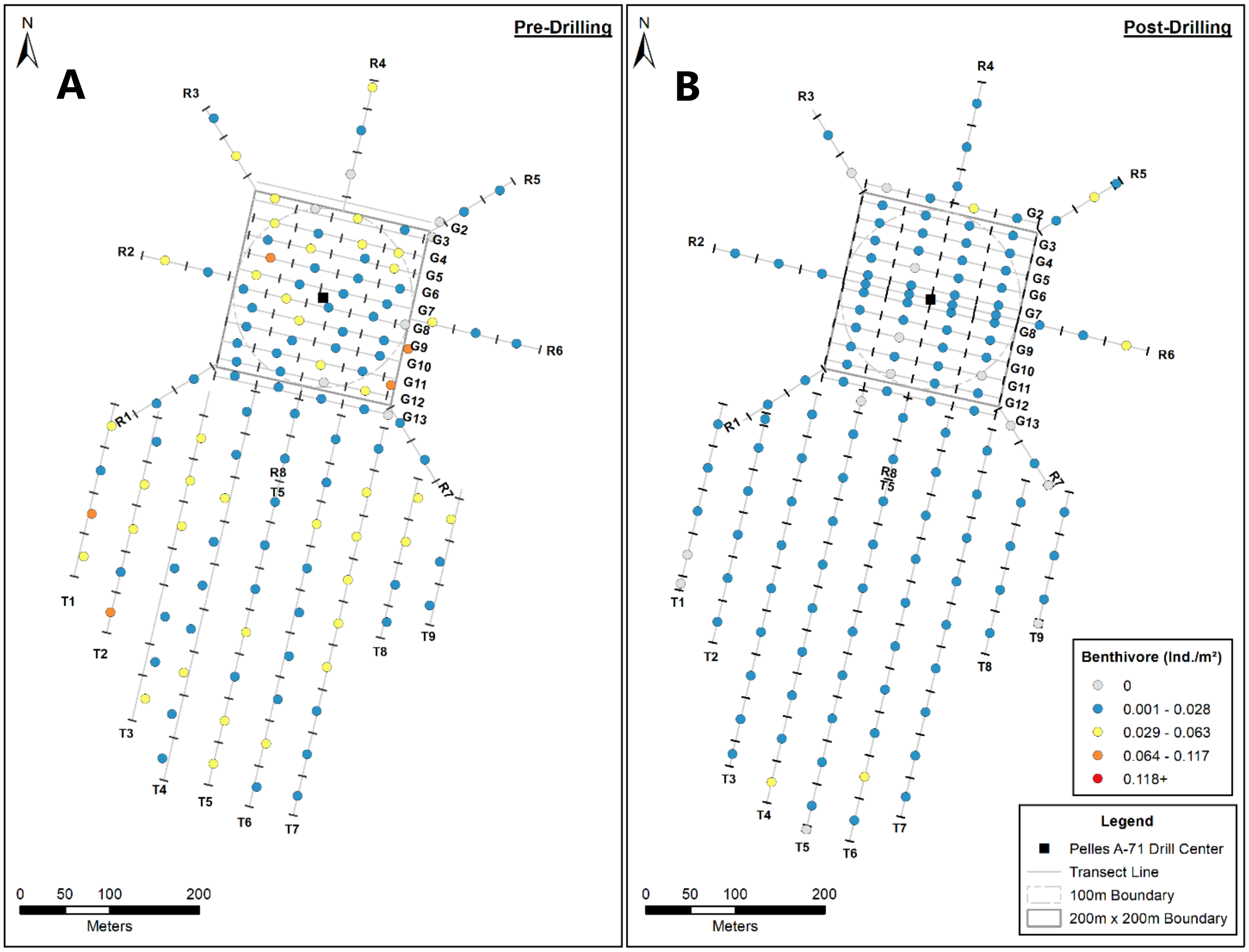

Figure 3-30 Benthivore density per transect at Pelles A-71 in pre-drilling survey (A) and in the post-drilling survey (B).

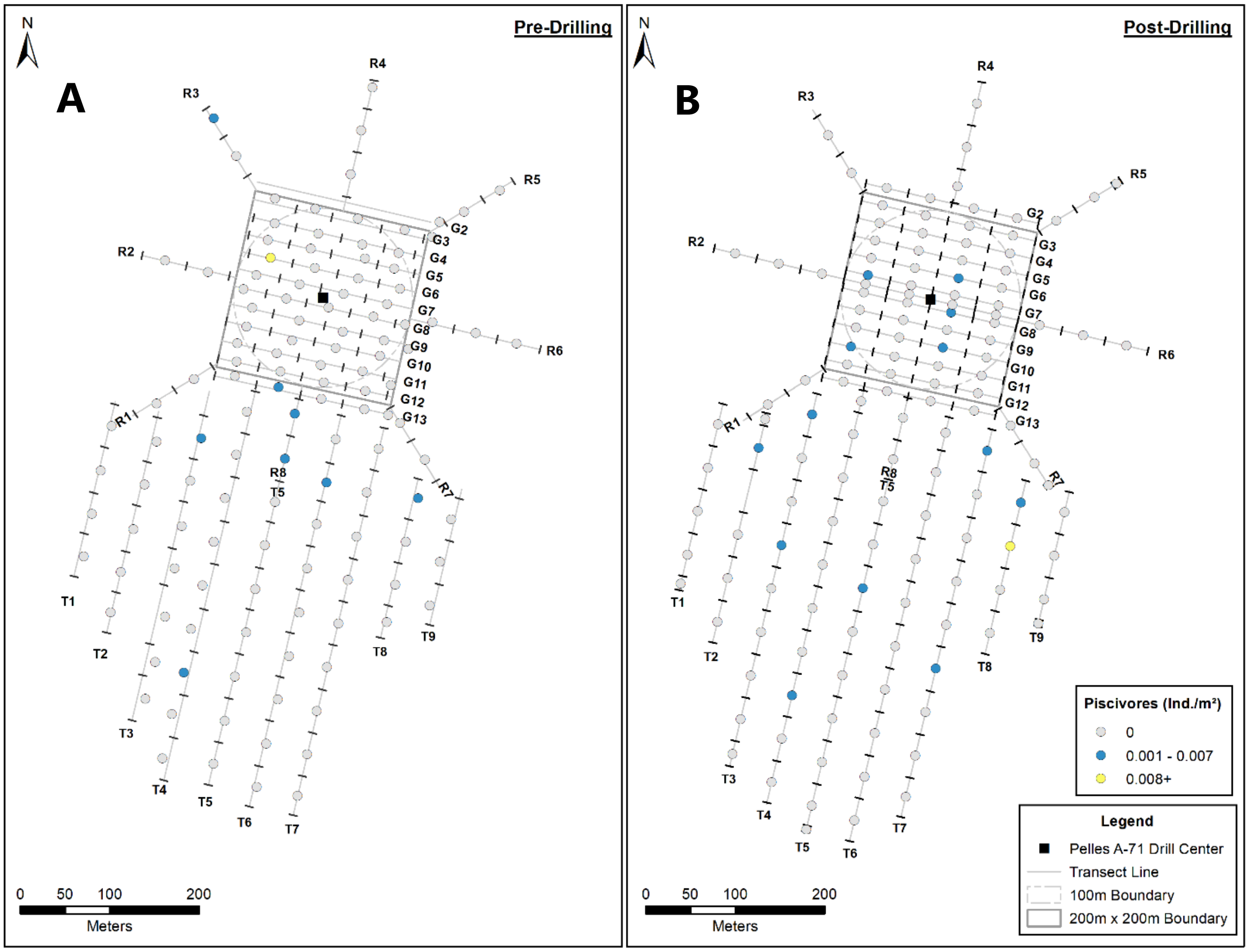

Figure 3-31 Piscivore density per transect at Pelles A-71 in pre-drilling survey (A) and in the post-drilling survey (B).

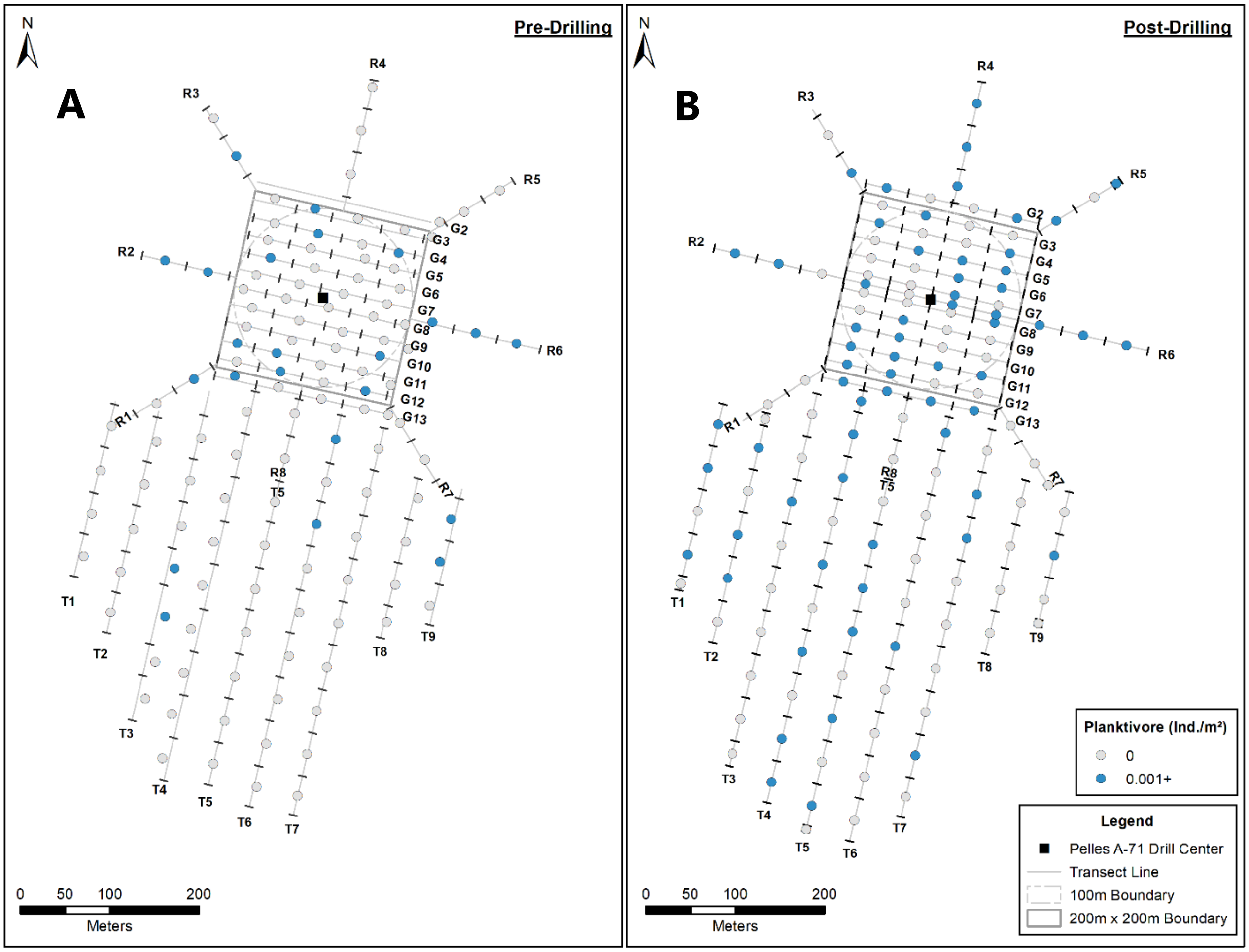

Figure 3-32 Planktivore density per transect at Pelles A-71 in pre-drilling survey (A) and in the post-drilling survey (B).

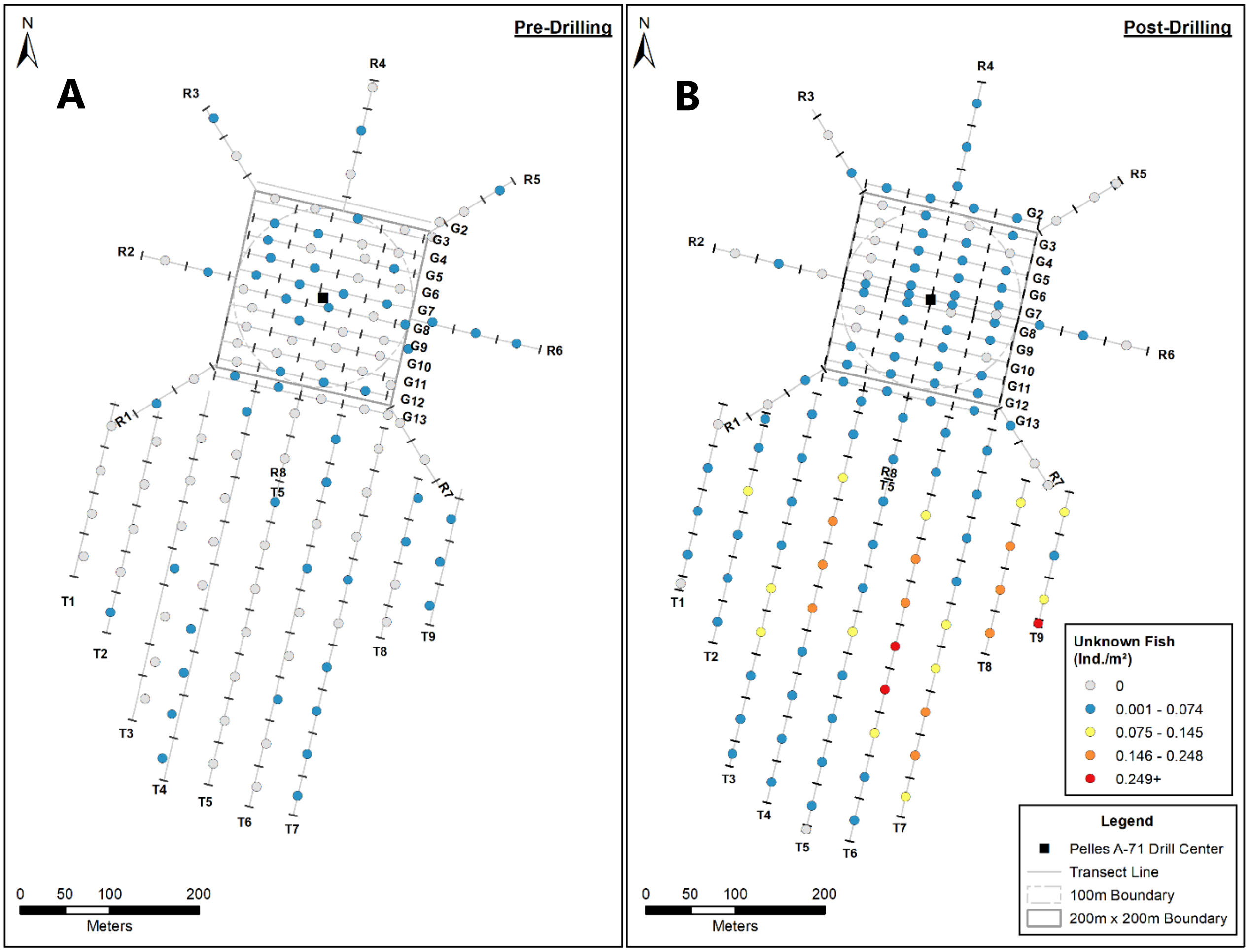

Figure 3-33 Unknown fish density per transect at Pelles A-71 in pre-drilling survey (A) and in the post-drilling survey (B).

3.5 Other Observations

During the Pelles A-71 post-drilling survey, recordings were made of anthropogenic debris, tracks, and other unidentified objects (Figure 3-34). Some anthropogenic debris was noted, including a barrel, a piece of rope or wire, and a lost transponder which was recovered during this survey (Figure 3-34 A, B, D). Tracks from previous ROV surveys were commonly noted throughout the grid lines area (Figure 3-34 C). Other unidentified debris included thin brown debris, potentially a piece of drifted kelp, and an unidentified piece of debris that may or may not have been organic in nature (Figure 3-34 E, F).

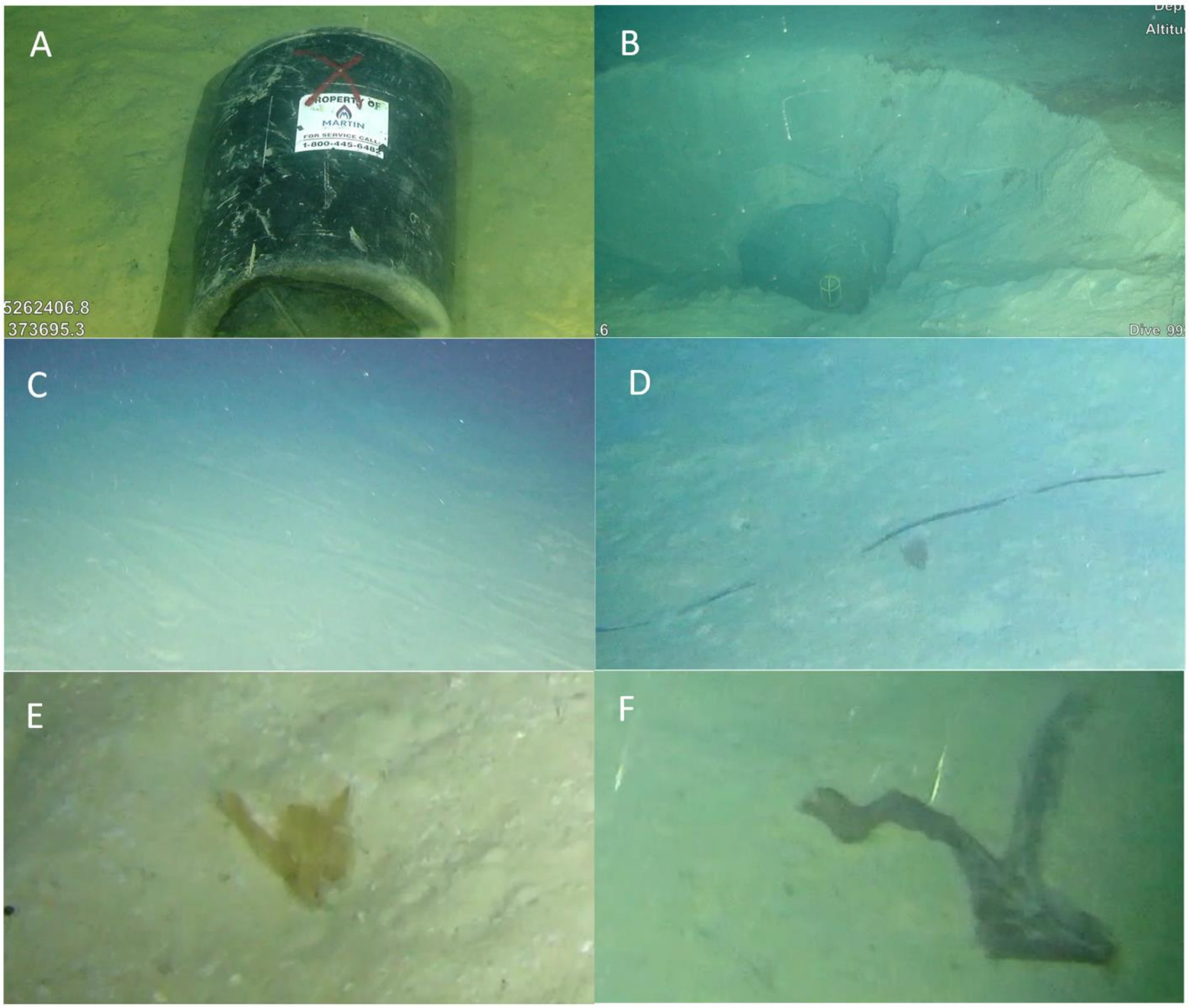

Figure 3-34 Other observations made during the Pelles A-71 post-drilling survey: A) plastic barrel, B) well hole with transponder, C) tracks from previous ROV survey, D) rope or wire, E) debris or algal remnant, and F) unidentified debris.

4.0 ASSESSMENT OF FOLLOW-UP MONITORING

4.1 Drill Cuttings Extent and Thickness

For the drill cuttings extent and thickness, the use of several methodologies allowed for a better overall understanding of the dispersal area and the range of thicknesses. The use of external markers on the wellhead prior to jetting allowed for measurement of the deepest burial depth (1.5 m). In combination with the deposition poles showing burial of 0.15 m to 0.20 m roughly 50 m from the wellhead, the area of heaviest deposition could be delineated. Visual cues of the extent of cuttings were clearly able to identify areas of heavy deposition, and the general transition zone between cuttings and existing, natural substrate. While the identification of the transition zone was challenging, the use of visual assessment worked well for cuttings identification. The deposition of cuttings was lower than the maximum modelled deposition depths that ranged from 2.71-2.87 m (WBM) within 10 m of the wellhead and 0.21-0.26 m (WBM) within 10-100 m from the wellhead.

The penetration depths were less useful overall for measurement of drill cuttings thickness. As the baseline substrate in the Flemish Pass is predominantly mud, additional drilling mud deposited on top of fine substrate does not allow for easy differentiation. In hard compact or gravelly areas with little or minimum penetration during baseline measurement, this method it typically more useful. The majority of post-drilling depth measurements were greater than the length of the push ruler, even in areas with no predicted or visible cuttings. As the values were highly variable and did not consistently vary with distance from the wellhead or agree with the modelled drill cuttings footprint, it is assumed that these results are from small-scale variability of the exact location of the penetration test or potentially variability in ROV operator and not related to drill cuttings accumulation.

Deposition poles worked well for the measurement of drill cuttings. Poles at reference stations did not visibly sink into the seafloor and a background veneer of sediment was recorded at these stations. Poles were not difficult to find, and the attached ruler and zipties were easy to read. None of the poles used in this survey in the transect area appeared to have cuttings burial, though some did have flecks present.

The extent of drill cuttings was determined through change in surficial substrate and visual observations of drill cuttings. The main difference in surficial sediment between the pre- and post-survey was additional fines near and south of the well centre, noted in Figure 3-3, which is primarily cuttings. While minor changes to areas of hard substrate were recorded, fine substrate remained between 85% to 100% of the surficial substrate at this site.

Bioturbation and newly formed divots were already recorded throughout the visible deposition area, and a thin layer of background sedimentation appeared to already be overlaying the cuttings area. A burial area of drill cuttings was predicted to extend throughout the grid and transect areas (Figure 1-1). However, the areas of drill cuttings accumulations (e.g., visible deposition, transition zone) was smaller than predicted. As indicated by the model, SBM drill cuttings that were discharged high in the water column were predicted to drift up to 2 km from the wellsite, but not form any burial accumulations. This was recorded in the follow-up monitoring with flecks of drill cuttings observed to the extent of the survey area to the south, but no burial accumulations observed.

4.2 Benthic Fauna

Soft corals, branching corals, and sea pens were the most abundant coral groups overall, and all showed similar declines between the pre- and post-drilling survey. Soft corals and sea pens significantly differed between surveys, with lower values in the post-drilling survey. The interaction term was also significant for both groups, indicating uneven changes between the two surveys across the areas. For all the other coral groups, very few individuals were recorded overall with minimal changes between the two surveys. Declines for most groups were steepest within the grid lines area, with no coral present within the visible deposition area near the wellhead (within ~50 m). This is to be expected, as corals are sessile or only capable of slow short-distance movements. Many corals were still present and in good condition within the transition zone, and within the cluster and fleck areas to the south. Overall, corals declined or remained similar throughout the Pelles A-71 area which is within the predicted effects outlined in the EIS (Nexen 2018) that indicated potential effects throughout the drill cuttings dispersion area.

Sponges throughout the Pelles A-71 area had low densities overall in both the pre- and post-drilling survey, and changes were less consistent than those observed for corals. Some sponge groups showed declines in the grid lines area, and other groups showed increases from the pre-drilling survey. As sponges are sessile and slow growing, these are not likely new individuals, but differences in ROV path travelled, the use of standard definition video for the pre-drilling survey and high definition for the post-drilling also allowed for more accurate identification, and therefore potential differences between surveys. Similar to corals however, no sponges were recorded within the visible deposition area though many were present in the transition area with little to no surface veneers.

For invertebrates, a similar trend to corals was observed with general declines in density throughout. Echinoderms significantly differed between surveys, with lower densities in the post-drilling survey, and had a significant interaction term as well. Few invertebrates were noted within the visible deposition area near the wellhead, though some echinoderms were noted near the edges. While many invertebrates were still present within the transition zone, cerianthid anemones (cnidarians) were absent and were a reliable indication of the presence of drill cuttings. As they inhabit small burrows within the substrate, this particular group of invertebrates may be vulnerable to any amount of cuttings deposition. Evidence of benthic invertebrates in the form of burrows, divots, and tracks were recorded throughout the cuttings deposition area.

Overall, fish were present throughout Pelles A-71 at low densities, with benthivores being the most numerous and diverse fish functional group. A general decline across all three areas was noted for benthivores, which may be due to lack of prey as invertebrates declined throughout. Small numbers of Greenland halibut (piscivore) and lanternfish (planktivore) were recorded throughout, including near the well centre, both during the pre- and post-drilling survey. However, unidentified fish increased in density in the transect area from the pre-drilling survey. This change is due to a small species of fish residing in high densities within small divots in the sediment throughout the transect area. Due to their small size and few identifying characteristics, these fish were not identified as part of this survey, though may be juveniles of other fish species recorded. Their presence is likely seasonal in nature.

5.0 FULLFILLMENT OF CONDITIONS AND ASSESSMENT OF MODEL PREDICTIONS

The following summarizes the follow-up monitoring results with the specific Conditions in the Decision Statement associated with drill cuttings monitoring.

3.12 The Proponent shall develop and implement follow-up requirements, pursuant to condition 2.5, to verify the accuracy of the predictions made during the environmental assessment as it pertains to fish and fish habitat, including marine mammals and sea turtles, and to determine the effectiveness of mitigation measures identified under conditions 3.1 to 3.11. As part of these follow-up requirements, for the duration of the drilling program the Proponent shall:

3.12.1 for every well, measure the concentration of synthetic-based drilling fluids retained on discharged drill cuttings as described in the Offshore Waste Treatment Guidelines (OWTG) to verify that the discharge meets, at a minimum, the performance targets set out in the Guidelines and any applicable legislative requirements, and report the results to the Board;

- The OWTG specifies that SOC levels should not exceed 6.9 g/100 g oil on wet solids. As detailed in Section 3.1, the highest reported level from the drilling unit was 3.84 g/100 g oil on wet solids. Therefore, the discharges meet the performance targets set out in the OWTG and addresses Condition 3.12.1 of the decision statement.

3.12.2 for the first well in each exploration licence, and for any well where drilling is undertaken in an area determined by seabed investigation surveys to be sensitive benthic habitat, and for any well located within a special area designated as such due to the presence of sensitive coral and sponge species, or a location near a special area where drill cuttings dispersion modelling predicts that drill cuttings deposition may have adverse effects, develop and implement, in consultation with Fisheries and Oceans Canada and the Board, follow-up requirements to verify the accuracy of the environmental assessment and effectiveness of mitigation measures as they pertain to the effects of drill cuttings discharges on benthic habitat. Follow-up shall include;

3.12.2.1 measurement of sediment deposition extent and thickness post-drilling to verify the drill waste deposition modeling predictions;

- Drill cuttings were predicted to be mostly distributed SSW from the wellhead with the majority of cuttings deposited within 500 m, with some SBM cuttings out to 2 km. Cuttings deposition extent and thickness was evaluated through a combination of visual assessments, depth penetration measurements, comparison to subsea infrastructure, and deposition poles. Based on these combined survey methodologies, the observed accumulated drill cuttings footprint was limited to within 100 m from the wellhead with drifts of low quantities of drill cuttings (flecks and clusters approximately 625 m from the wellhead (southern grid lines and transect areas). Overall, the observed drill cuttings deposition had a lower extent and lower thickness relative to model predictions.

3.12.2.2 benthic fauna surveys to verify the effectiveness of mitigation measures; and

- Smothering was predicted to be within 500 m of the drill centre where the majority of drill cuttings deposition was predicted to occur. Within the drill cuttings footprint 100 m from the wellhead, no sessile organisms were recorded on survey transects though some invertebrates and fish were present. No smothering or burial is likely outside this footprint, as the recorded flecks and clusters are not large enough to bury organisms. Overall, the density of fauna in the post-drilling survey is lower than that observed in the pre-drilling survey. This is likely from a combination of smothering and burial, and potential avoidance of the area by mobile fauna. These effects are consistent in that assessed for the Flemish Pass Exploration Drilling Project EIS (Nexen 2018).

3.12.2.3 the Proponent shall report the information collected, as identified in conditions 3.12.2.1 and 3.12.2.2, including a comparison of modelling results to in situ results, to the Board within 60 days following the drilling of the first well in each exploration licence.

- As identified directly above and in the preceding sections of this report, model results were compared to *in situ* results and found that cuttings were both more localized and lower thicknesses (accumulations) relative the model's predictions.

6.0 CLOSURE

This follow-up monitoring report for Pelles A-71 has been prepared for the exclusive use of CNOOC. The project was conducted using standard practices by qualified Wood staff and in accordance with verbal and written requests from the client.

Yours sincerely,

**Wood Environment & Infrastructure Solutions,
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APPENDIX A: PROJECT COORDINATES

Table A.1 Drill cuttings measurement device deployment location.

Location Name	Target Position (NAD83, Zone 23)		Order	Deployed Position (NAD83)	
	Easting	Northing		Easting	Northing
T8-N	373436	5262346	2	373436.488	5262344.225
T12-N	373611	5262217	7	373609.495	5262214.672
T16-N	373824	5262247	14	373824.161	5262247.192
T8-M	373411	5262240	6	373409.430	52622.9.053
T12-M	373570	5262041	13	373570.78	5262041.42
T16-M	373806	5262171	12	373806713	5262170.235
T4	373680	5262509	5	373678.65	5262509.22
T1	373626	5262434	15	373625.29	5262433.87
T7	373694	5262419	3	373692.10	5262419.26
S-T6	373911	5262353	10	373909.180	5262354.350
T12-S	373529	5261806	11	373528.56	5261804.57
T16-S	373787	5262044	4	373787.300	5262041.700
T4-N	373735	5262753	8	373735.235	5262753.906
T8-S	373375	5262086	1	373372.52	5262086.47

Table A.2 Grid seabed survey transect start and end coordinates.

Transect	Transect Section	Coordinates (NAD83, Zone 23)			
		Northing Start	Easting Start	Northing End	Easting End
G2	G2-1	373594.5	5262591.0	373643.0	5262578.4
G2	G2-2	373643.0	5262578.4	373693.6	5262566.1
G2	G2-3	373693.6	5262566.1	373741.1	5262558.7
G2	G2-4	373741.1	5262558.7	373783.3	5262548.2
G3	G3-1	373786.9	5262524.4	373735.5	5262537.2
G3	G3-2	373735.5	5262537.2	373686.8	5262547.6
G3	G3-3	373686.8	5262547.6	373638.7	5262561.6
G3	G3-4	373638.7	5262561.6	373587.9	5262571.1
G4	G4-1	373582.8	5262550.3	373633.3	5262536.4
G4	G4-2	373633.3	5262536.4	373683.1	5262527.8
G4	G4-3	373683.1	5262527.8	373732.4	5262516.9
G4	G4-4	373732.4	5262516.9	373785.4	5262505.6
G5	G5-1	373785.7	5262486.2	373727.6	5262496.8
G5	G5-2	373727.6	5262496.8	373680.2	5262512.1
G5	G5-3	373680.2	5262512.1	373630.2	5262521.1
G5	G5-4	373630.2	5262521.1	373586.6	5262529.9
G6	G6-1	373576.2	5262511.1	373626.7	5262499.8
G6	G6-2	373626.7	5262499.8	373674.4	5262488.6
G6	G6-3	373674.4	5262488.6	373723.6	5262478.8
G6	G6-4	373723.6	5262478.8	373772.7	5262467.5
G7	G7-1	373768.2	5262448.1	373719.5	5262456.6
G7	G7-2	373719.5	5262456.6	373671.1	5262470.8
G7	G7-3	373671.1	5262470.8	373621.0	5262476.8
G7	G7-4	373621.0	5262476.8	373566.2	5262490.3
G8	G8-1	373567.5	5262473.1	373616.1	5262460.0
G8	G8-2	373616.1	5262460.0	373665.9	5262450.5
G8	G8-3	373665.9	5262450.5	373714.7	5262439.6
G8	G8-4	373714.7	5262439.6	373763.6	5262428.1
G9	G9-1	373759.4	5262409.8	373709.7	5262417.9
G9	G9-2	373709.7	5262417.9	373662.1	5262431.8
G9	G9-3	373662.1	5262431.8	373613.8	5262445.0
G9	G9-4	373613.8	5262445.0	373564.8	5262454.9
G10	G10-1	373560.0	5262435.3	373608.1	5262425.1
G10	G10-2	373608.1	5262425.1	373657.1	5262413.5
G10	G10-3	373657.1	5262413.5	373706.2	5262401.7

Transect	Transect Section	Coordinates (NAD83, Zone 23)			
		Northing Start	**Easting Start**	**Northing End**	**Easting End**
G10	G10-4	373706.2	5262401.7	373754.7	5262389.9
G11	G11-1	373751.3	5262372.0	373701.3	5262382.2
G11	G11-2	373701.3	5262382.2	373652.3	5262391.2
G11	G11-3	373652.3	5262391.2	373602.7	5262401.3
G11	G11-4	373602.7	5262401.3	373554.7	5262413.4
G12	G12-1	373550.2	5262393.4	373598.8	5262382.0
G12	G12-2	373598.8	5262382.0	373647.5	5262371.4
G12	G12-3	373647.5	5262371.4	373696.1	5262360.6
G12	G12-4	373696.1	5262360.6	373745.3	5262349.4
G13	G13-1	373740.9	5262330.4	373692.3	5262342.0
G13	G13-2	373692.3	5262342.0	373643.4	5262352.4
G13	G13-3	373643.4	5262352.4	373595.1	5262363.8
G13	G13-4	373595.1	5262363.8	373545.4	5262373.8
G14	R2-4	373570.3	5262479.6	373620.1	5262470.7
G14	R2-5	373620.1	5262470.7	373663.3	5262460.5
G14	R6-1	373667.0	5262460.8	373715.5	5262444.4
G14	R6-2	373715.5	5262444.4	373766.3	5262439.3

Table A.3 Radials seabed survey transect start and end coordinates.

Transect	Transect Section	Coordinates (NAD83, Zone 23)			
		Northing Start	Easting Start	Northing End	Easting End
R1	R1-1	373553.1	5262383.9	373508.7	5262354.1
R1	R1-2	373508.7	5262354.1	373471.3	5262330.7
R2	R2-1	373425.0	5262519.8	373471.7	5262498.8
R2	R2-2	373471.7	5262498.8	373519.5	5262495.8
R2	R2-3	373519.5	5262495.8	373570.3	5262479.6
R3	R3-1	373535.3	5262672.8	373562.5	5262622.1
R3	R3-2	373562.5	5262622.1	373583.4	5262586.4
R4	R4-1	373692.8	5262567.7	373706.0	5262607.7
R4	R4-2	373706.0	5262607.7	373716.3	5262656.1
R4	R4-3	373716.3	5262656.1	373738.3	5262705.9
R5	R5-1	373785.6	5262535.2	373832.8	5262558.7
R5	R5-2	373832.8	5262558.7	373875.4	5262586.4
R5	R5-3	373875.4	5262586.4	373881.7	5262592.5
R6	R6-3	373766.3	5262439.3	373814.4	5262426.7
R6	R6-4	373814.4	5262426.7	373862.7	5262415.2
R6	R6-5	373862.7	5262415.2	373912.6	5262403.6
R7	R7-1	373743.5	5262340.6	373769.3	5262298.0
R7	R7-2	373769.3	5262298.0	373796.2	5262255.5
R7	R7-3	373796.2	5262255.5	373802.5	5262249.8
R8	R8-1	373624.6	5262258.2	373633.2	5262304.3
R8	R8-2	373633.2	5262304.3	373649.6	5262350.6

Table A.4 Transect seabed survey transect start and end coordinates.

Transect	Transect Section	Coordinates (NAD83, Zone 23)			
		Northing Start	Easting Start	Northing End	Easting End
T1	T1-1	373435.9	5262338.4	373427.4	5262296.2
T1	T1-2	373427.4	5262296.2	373406.1	5262248.1
T1	T1-3	373406.1	5262248.1	373403.8	5262199.3
T1	T1-4	373403.8	5262199.3	373394.1	5262150.7
T1	T1-5	373394.1	5262150.7	373393.6	5262143.3
T2	T2-1	373426.3	5262072.9	373437.4	5262125.0
T2	T2-2	373437.4	5262125.0	373447.0	5262173.4
T2	T2-3	373447.0	5262173.4	373458.7	5262221.9
T2	T2-4	373458.7	5262221.9	373472.5	5262269.5
T2	T2-5	373472.5	5262269.5	373484.1	5262318.4
T2	T2-6	373484.1	5262318.4	373486.7	5262334.4
T3	T3-1	373441.4	5261937.6	373449.4	5261967.1
T3	T3-2	373449.4	5261967.1	373461.4	5262015.7
T3	T3-3	373461.4	5262015.7	373471.2	5262064.3
T3	T3-4	373471.2	5262064.3	373484.3	5262113.0
T3	T3-5	373484.3	5262113.0	373495.6	5262161.5
T3	T3-6	373495.6	5262161.5	373507.4	5262210.3
T3	T3-7	373507.4	5262210.3	373518.2	5262259.1
T3	T3-8	373518.2	5262259.1	373531.1	5262307.7
T3	T3-9	373531.1	5262307.7	373541.2	5262356.6
T4	T4-1	373484.0	5261896.5	373498.1	5261944.3
T4	T4-10	373585.7	5262334.4	373591.7	5262361.4
T4	T4-2	373498.1	5261944.3	373509.6	5261993.0
T4	T4-3	373509.6	5261993.0	373519.5	5262042.0
T4	T4-4	373519.5	5262042.0	373533.1	5262090.1
T4	T4-5	373533.1	5262090.1	373544.4	5262139.4
T4	T4-6	373544.4	5262139.4	373554.0	5262188.0
T4	T4-7	373554.0	5262188.0	373564.8	5262236.9
T4	T4-8	373564.8	5262236.9	373576.8	5262285.4
T4	T4-9	373576.8	5262285.4	373585.7	5262334.4
T5	T5-1	373620.3	5262261.2	373608.4	5262211.1
T5	T5-2	373608.4	5262211.1	373596.2	5262162.2
T5	T5-3	373596.2	5262162.2	373586.5	5262113.5
T5	T5-4	373586.5	5262113.5	373576.5	5262064.9
T5	T5-5	373576.5	5262064.9	373561.9	5262016.7

Transect	Transect Section	Coordinates (NAD83, Zone 23)			
		Northing Start	**Easting Start**	**Northing End**	**Easting End**
T5	T5-6	373561.9	5262016.7	373551.1	5261967.7
T5	T5-7	373551.1	5261967.7	373538.1	5261919.0
T5	T5-8	373538.1	5261919.0	373527.3	5261870.1
T5	T5-9	373527.3	5261870.1	373527.3	5261865.3
T6	T6-1	373578.1	5261853.1	373589.5	5261901.9
T6	T6-10	373678.5	5262292.2	373685.0	5262323.1
T6	T6-2	373589.5	5261901.9	373600.5	5261950.8
T6	T6-3	373600.5	5261950.8	373612.1	5261999.8
T6	T6-4	373612.1	5261999.8	373620.2	5262048.6
T6	T6-5	373620.2	5262048.6	373636.1	5262096.8
T6	T6-6	373636.1	5262096.8	373646.6	5262145.6
T6	T6-7	373646.6	5262145.6	373656.8	5262194.7
T6	T6-8	373656.8	5262194.7	373667.2	5262243.6
T6	T6-9	373667.2	5262243.6	373678.5	5262292.2
T7	T7-1	373737.3	5262316.3	373725.4	5262267.1
T7	T7-2	373725.4	5262267.1	373714.2	5262218.5
T7	T7-3	373714.2	5262218.5	373701.4	5262169.8
T7	T7-4	373701.4	5262169.8	373690.9	5262121.1
T7	T7-5	373690.9	5262121.1	373677.0	5262072.7
T7	T7-6	373677.0	5262072.7	373669.0	5262023.6
T7	T7-7	373669.0	5262023.6	373654.6	5261975.5
T7	T7-8	373654.6	5261975.5	373644.8	5261926.5
T7	T7-9	373644.8	5261926.5	373632.6	5261886.1
T8	T8-1	373726.6	5262063.7	373737.9	5262111.9
T8	T8-2	373737.9	5262111.9	373750.4	5262160.6
T8	T8-3	373750.4	5262160.6	373762.1	5262209.2
T8	T8-4	373762.1	5262209.2	373772.5	5262259.0
T9	T9-1	373822.5	5262246.8	373811.9	5262198.6
T9	T9-2	373811.9	5262198.6	373799.6	5262150.0
T9	T9-3	373799.6	5262150.0	373788.9	5262101.0
T9	T9-4	373788.9	5262101.0	373788.4	5262095.8

APPENDIX B: Raw Data

Table B.1 Pelles A-71 drill cuttings monitoring survey analysis data.

															Abundance																																									
						Substrate Type (% Coverage)									Echinoderms					Cnidaria			oph	rthropo		neli	Molluscs		hiop	Corals					Sponges						Fish															the
Transect	Section	Date	Time Start	Time End	Section Length (m)	Bedrock	Boulders	Rubble	Cobble	Gravel	Sand	Mud	Organic Detritus	Shell	Ech_Sea Urchins	Ech_Sea Stars	Ech_Brittle Star	Ech_Brisingid	Ech_Basket Stars	Cni_Sea Anemones	Cni_Jellyfish	Cni_Hydroids	Cte_Ctenophores	Art_Shrimp	Art_Crab	Ann_Annelids	Mol_Gastropods	Mol_Cephalopods	Bra_Brachiopods	Soft Corals	Black Corals	Hard Corals	Branching corals	Sea Pens	Solid / Massive	Leaf / Vase Shaped	Round with Projection	Thin-Walled, Complex	Stalked	Other	Ben_Grenadiers	Ben_Skates	Ben_Wolf Eels	Ben_Blue Hake	Pis_Greenland Halibut	Ben_Wolffish (specify	PlP_Redfish	Ben_Rockling	Ben_Longnose Eel	Ben_Eelpout	Ben_Sculpin	Pla_Lanternfish	Pis_Shark	Unk_Anguilliform (gla	Unk_Other fish (juven	Unknown/other/debr
G2	1	2021-09-08	18:56:31	18:57:51	50	0	0	5	5	0	0	90	0	0	19	0	0	0	0	5	1	0	0	0	0	0	0	0	0	31	0	0	0	16	0	0	0	1	0	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
G2	2	2021-09-08	18:57:51	18:59:26	50	0	0	5	5	0	0	90	0	0	14	1	0	0	0	12	1	0	0	0	0	0	0	1	0	32	0	0	4	28	3	0	0	1	0	4	1	0	0	0	0	0	0	1	1	0	0	1	0	1	2	0
G2	3	2021-09-08	18:59:26	19:05:20	50	0	0	5	5	0	0	90	0	0	12	0	0	0	0	6	1	0	0	2	0	0	0	0	0	10	0	0	4	31	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0
G2	4	2021-09-08	19:05:20	19:07:26	50	0	5	5	0	0	0	90	0	0	8	1	0	0	0	12	2	0	0	1	0	0	0	0	0	49	0	0	1	32	5	0	0	0	0	8	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0
G3	1	2021-09-08	18:39:01	18:41:25	50	0	0	10	5	0	0	85	0	0	16	2	0	0	0	12	0	0	0	2	0	0	0	3	0	105	0	0	2	37	12	0	0	1	0	14	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
G3	2	2021-09-08	18:41:25	18:43:35	50	0	5	5	5	0	0	85	0	0	24	1	0	0	0	15	1	0	0	0	0	0	0	0	0	48	0	0	2	24	8	1	0	0	0	25	1	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0
G3	3	2021-09-08	18:43:35	18:46:05	50	0	5	5	0	0	0	90	0	0	20	1	0	0	0	5	5	0	1	2	0	0	0	1	0	31	0	0	2	29	1	0	0	1	0	9	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0
G3	4	2021-09-08	18:46:05	18:48:59	50	0	5	5	5	0	0	85	0	0	8	0	0	0	0	4	2	0	0	0	0	0	0	0	0	56	0	0	5	19	2	3	1	0	0	8	1	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0
G4	1	2021-09-08	18:25:00	18:27:00	50	0	5	5	0	0	0	90	0	0	11	1	0	0	0	8	2	0	0	0	0	0	0	1	0	38	0	0	3	25	4	0	0	0	0	8	2	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0
G4	2	2021-09-08	18:27:00	18:28:45	50	0	0	5	5	0	0	90	0	0	1	0	0	0	0	5	4	0	1	1	0	0	0	1	0	46	0	0	5	19	1	1	0	0	0	3	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0
G4	3	2021-09-08	18:28:45	18:30:40	50	0	5	5	5	0	0	85	0	0	8	0	0	1	0	19	3	0	1	1	0	0	0	0	0	45	0	0	0	22	4	0	0	2	0	4	0	0	0	0	0	0	0	0	2	0	0	1	0	0	1	0
G4	4	2021-09-08	18:30:40	18:32:58	50	0	0	10	5	0	0	85	0	0	15	0	1	0	0	10	1	0	0	2	0	0	0	0	0	66	0	0	5	28	1	0	0	0	0	11	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
G5	1	2021-09-08	17:49:01	17:52:16	50	0	5	5	5	0	0	85	0	0	14	1	0	0	0	12	2	0	0	0	0	0	0	0	0	57	0	0	0	24	1	1	0	1	0	2	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0
G5	2	2021-09-08	17:52:16	18:15:06	50	0	0	0	5	0	0	95	0	0	3	1	1	0	0	4	8	0	1	0	0	0	0	2	0	8	0	0	2	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0
G5	3	2021-09-08	18:15:06	18:17:32	50	0	5	5	0	0	0	90	0	0	5	1	0	0	0	3	1	0	1	2	0	0	0	4	12	28	0	0	1	9	1	0	0	0	0	18	0	1	0	0	1	0	0	0	3	0	0	0	0	0	1	0
G5	4	2021-09-08	18:17:32	18:19:59	50	0	0	5	5	0	0	90	0	0	10	0	0	0	0	7	0	0	0	1	0	0	0	1	0	18	0	0	8	25	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G6	1	2021-09-08	17:37:38	17:39:22	50	0	0	5	5	0	0	90	0	0	9	2	0	0	0	4	0	0	0	1	0	0	0	0	0	21	0	0	4	30	1	1	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0
G6	2	2021-09-08	17:39:22	17:41:09	50	0	0	0	5	0	0	95	0	0	1	0	0	0	0	2	1	0	1	0	0	0	0	1	0	1	0	0	0	1	5	0	0	0	0	0	1	1	0	0	0	0	0	1	1	0	0	2	0	1	0	0
G6	3	2021-09-08	17:41:09	17:43:04	50	0	0	0	0	0	0	100	0	0	3	0	0	0	0	0	2	0	0	0	0	0	0	3	0	1	0	0	1	5	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	3	0	1	1	0
G6	4	2021-09-08	17:43:04	17:45:10	50	0	5	5	5	0	0	85	0	0	9	1	0	0	0	1	0	0	0	0	0	0	0	0	0	54	0	0	1	23	6	1	1	0	0	17	3	0	0	0	1	0	0	0	1	0	0	1	0	1	0	0
G7	1	2021-09-08	17:18:28	17:20:29	50	0	0	5	5	0	0	90	0	0	11	1	0	0	0	8	5	0	0	2	0	0	0	1	0	26	0	0	7	14	1	0	0	1	0	3	2	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0
G7	2	2021-09-08	17:20:29	17:22:37	50	0	0	0	0	0	0	100	0	0	0	1	0	0	0	0	7	0	0	0	0	0	0	2	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	1	0
G7	3	2021-09-08	17:22:37	17:24:57	50	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	2	0	0	0	0	1	0	0
G7	4	2021-09-08	17:24:57	17:27:55	50	0	0	5	5	0	0	90	0	0	17	1	0	0	0	10	1	0	0	0	0	0	0	0	0	30	0	0	5	26	4	3	0	0	0	6	0	0	0	0	0	0	0	0	2	0	0	0	0	1	0	0
G8	1	2021-09-08	17:02:49	17:04:30	50	0	0	5	5	0	0	90	0	0	6	0	0	0	0	4	2	0	1	2	0	0	0	2	0	11	0	0	3	15	0	2	0	0	0	0	2	0	0	1	0	0	0	1	1	0	0	1	0	2	0	0
G8	2	2021-09-08	17:04:30	17:06:21	50	0	0	0	0	0	0	100	0	0	0	0	0	0	0	2	4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0	1	1	0
G8	3	2021-09-08	17:06:21	17:08:27	50	0	0	0	5	0	0	95	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0	4	0	0
G8	4	2021-09-08	17:08:27	17:10:32	50	0	0	0	5	0	0	95	0	0	15	0	0	0	0	13	2	0	0	3	0	0	0	0	0	13	0	0	2	23	1	0	0	0	0	3	5	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0
G9	1	2021-09-08	16:22:40	16:25:09	50	0	5	5	5	0	0	85	0	0	10	1	0	0	0	1	3	0	2	2	0	0	0	2	0	32	0	0	2	9	0	0	0	0	0	8	1	0	0	0	0	0	0	0	2	0	0	3	0	1	0	0
G9	2	2021-09-08	16:25:09	16:27:37	50	0	0	0	0	0	0	100	0	0	2	0	0	0	0	2	2	0	1	2	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0	0
G9	3	2021-09-08	16:27:37	16:53:03	50	0	5	0	0	0	0	95	0	0	1	0	0	0	0	1	2	0	2	2	0	0	0	1	0	5	1	0	0	8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	2	0	4	0	0
G9	4	2021-09-08	16:53:03	16:56:02	50	0	0	5	5	0	0	90	0	0	7	2	0	0	0	6	0	0	0	0	0	0	0	2	0	20	0	0	0	18	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2	0	0	3	0	0	0	0
G10	1	2021-09-08	15:54:56	15:56:47	50	0	5	5	5	0	0	85	0	0	7	1	1	0	0	2	0	0	0	2	0	0	0	0	0	17	0	0	2	11	2	1	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0
G10	2	2021-09-08	15:56:47	15:58:35	50	0	0	5	0	0	0	95	0	0	5	0	0	0	0	0	3	0	0	0	0	0	0	0	0	7	0	0	0	4	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0
G10	3	2021-09-08	15:58:35	16:13:40	50	0	0	5	5	0	0	90	0	0	8	0	0	0	0	1	1	0	0	2	0	0	0	1	0	5	0	0	1	7	0	0	0	0	0	0	7	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0
G10	4	2021-09-08	16:13:40	16:16:00	50	0	5	5	5	0	0	85	0	0	14	3	0	0	0	5	0	0	0	0	0	0	0	2	0	32	0	0	2	28	0	0	0	0	0	1	0	0	0	0	0	0	0	0	3	0	0	4	0	0	1	0
G11	1	2021-09-08	15:40:32	15:42:50	50	0	5	5	5	0	0	85	0	0	9	1	0	0	0	1	2	0	1	0	0	0	0	0	0	40	0	0	4	34	0	0	0	0	0	6	0	0	0	0	0	0	0	0	3	0	0	0	0	2	2	0
G11	2	2021-09-08	15:42:50	15:44:51	50	0	0	5	5	0	0	90	0	0	14	1	0	0	0	8	0	0	1	0	0	0	0	2	0	21	0	0	0	2	0	1	0	0	0	3	1	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0
G11	3	2021-09-08	15:44:51	15:47:08	50	0	0	5	5	0	0	90	0	0	5	0	0	0	0	0	0	0	0	1	0	0	0	1	0	14	0	0	2	4	1	0	0	0	0	2	1	0	0	0	0	0	0	0	1	0	0	1	0	2	0	0
G11	4	2021-09-08	15:47:08	15:49:32	50	0	5	5	5	0	0	85	0	0	4	1	0	0	0	14	1	0	0	1	0	0	0	0	0	42	0	0	2	21	2	1	0	0	0	10	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
G12	1	2021-09-08	15:22:55	15:24:41	50	0	5	5	5	0	0	85	0	0	8	1	0	0	0	0	0	0	1	0	0	0	0	1	0	43	0	0	6	17	2	1	0	0	0	5	3	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0
G12	2	2021-09-08	15:24:41	15:26:36	50	0	10	5	5	0	0	80	0	0	8	2	0	0	0	0	4	0	0	0	0	0	0	0	0	54	0	0	4	13	4	1	0	0	0	18	0	0	0	0	0	0	0	2	2	0	0	0	0	2	2	0
G12	3	2021-09-08	15:26:36	15:28:34	50	0	5	5	5	0	0	85	0	0	12	1	1	0	0	6	2	0	0	2	0	0	0	0	0	51	0	0	3	39	2	0	0	1	0	11	1	0	0	0	0	0	0	0	2	0	1	0	0	0	1	0
G12	4	2021-09-08	15:28:34	15:30:45	50	0	0	5	5	0	0	90	0	0	22	1	0	0	0	6	1	0	0	2	0	0	0	1	0	71	0	0	2	24	7	0	0	0	0	23	5	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
G13	1	2021-09-08	14:52:35	14:55:24	50	0	0	5	5	0	0	90	0	0	19	1	0	0	0	15	4	0	1	0	0	0	0	0	0	27	0	0	9	19	0	1	0	0	0	12	0	0	0	0	0	0	0	0	1	0	0	1	0	3	2	0
G13	2	2021-09-08	14:55:24	15:09:33	50	0	5	5	5	0	0	85	0	0	16	1	0	0	0	8	4	0	0	0	0	0	0	4	0	32	0	0	2	31	1	0	0	0	0	3	1	0	0	0	0	0	0	0	2	0	0	2	0	0	1	0
G13	3	2021-09-08	15:09:33	15:14:32	50	0	0	10	5	0	0	85	0	0	14	2	1	0	0	5	2	0	0	0	0	0	0	3	0	46	0	0	5	13	1	0	0	1	0	5	2	0	0	2	0	0	0	0	3	0	0	2	0	1	0	0
G13	4	2021-09-08	15:14:32	15:17:16	50	0	0	5	5	0	0	90	0	0	10	3	1	0	0	6	0	0	0	0	0	0	0	0	0	41	0	0	1	12	2	2	0	1	0	7	2	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0
G14 (R2)	4	2021-09-08	20:54:49	20:56:48	50	0	0	5	5	0	0	90	0	0	5	0	0	0	0	3	3	0	0	0	0	0	0	0	0	7	0	0	2	9	1	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G14 (R2)	5	2021-09-08	20:56:48	20:58:59	50	0	0	0	0	0	0	100	0	0	2	0	0	0	0	8	5	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
G14 (R6)	1	2021-09-08	21:04:00	21:09:07	50	0	0	0	0	0	0	100	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	0	0	0	1	1	0	0	2	0	0	1	0	1	0	0
G14 (R6)	2	2021-09-08	21:09:07	21:14:11	50	0	5	5	5	0	0	85	0	0	15	0	1	0	0	5	3	0	2	2	0	0	0	0	8	20	0	0	3	24	0	0	0	0	0	4	2	0	0	0	0	0	0	1	1	0	0	2	0	0	2	0
R1	1	2021-09-10	22:27:40	22:30:08	50	0	5	5	5	0	0	85	0	0	14	1	1	0	0	10	8	0	0	1	0	0	0	0	0	62	0	0	8	19	6	0	0	1	0	9	2	0	1	0	0	0	0	0	0	0	0	3	0	0	1	0
R1	2	2021-09-10	22:30:08	22:31:58	50	0	5	5	5	0	0	85	0	0	14	0	1	0	0	8	0	0	0	0	0	0	0	0	5	41	0	0	1	16	5	0	2	2	0	11	3	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
R2	1	2021-09-08	20:47:37	20:49:41	50	0	5	5	5	0	0	85	0	0	19	3	1	0	0	2	2	0	0	0	0	0	0	1	5	32	0	0	4	28	0	0	0	2	0	6	3	0	0	1	0	0	0	0	3	0	0	0	0	0	0	0
R2	2	2021-09-08	20:49:41	20:52:53	50	0	10	5	5	0	0	80	0	0	13	3	0	1	0	9	2	0	1	3	0	0	0	0	0	34	0	0	1	20	0	2	0	3	0	15	1	1	0	0	0	0	0	1	4	0	0	1	0	0	0	0
R2	3	2021-09-08	20:52:53	20:54:49	50	0	5	5	5	0	0	85	0	0	13	1	0	0	0	6	0	0	0	0	0	0	0	1	0	54	0	0	2	24	0	1	0	0	0	2	0	0	0	0	0	0	0	0	3	0	0	1	0	0	1	0
R3	1	2021-09-08	20:20:45	20:23:05	50	0	0	5	5	0	0	90	0	0	22	1	0	0	0	10	4	0	0	1	0	0	0	1	0	30	0	0	3	21	4	1	1	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R3	2	2021-09-08	20:23:05	20:26:43	50	0	5	5	5	0	0	85	0	0	15	1	3	0	0	7	5	0	0	1	0	0	0	2	6	49	0	0	6	13	5	2	0	2	0	13	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R4	1	2021-09-08	19:34:52	19:36:58	50	0	5	5	5	0	0	85	0	0	15	1	1	0	0	19	0	0	0	1	0	0	0	1	8	47	0	0	3	11	6	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0

						Substrate Type (% Coverage)									Abundance: Echinoderms					Cnidaria			oph	rthropo		neli	Mollusc		hiop	Corals					Sponges						Fish															Othe
Transect	Section	Date	Time Start	Time End	Section Length (m)	Bedrock	Boulders	Rubble	Cobble	Gravel	Sand	Mud	Organic Detritus	Shell	Ech_Sea Urchins	Ech_Sea Stars	Ech_Brittle Star	Ech_Brisingid	Ech_Basket Stars	Cni_Sea Anemones	Cni_Jellyfish	Cni_Hydroids	Cte_Ctenophores	Art_Shrimp	Art_Crab	Ann_Annelids	Mol_Gastropods	Mol_Cephalopods	Bra_Brachiopods	Soft Corals	Black Corals	Hard Corals	Branching corals	Sea Pens	Solid / Massive	Leaf / Vase Shaped	Round with Projectio	Thin-Walled, Comple	Stalked	Other	Ben_Grenadiers	Ben_Skates	Ben_Wolf Eels	Ben_Blue Hake	Pis_Greenland Halibut	Ben_Wolffish (specify	PIP_Redfish	Ben_Rockling	Ben_Longnose Eel	Ben_Eelpout	Ben_Sculpin	Pla_Lanternfish	Pis_Shark	Unk_Anguilliform (gla	Unk_Other fish (juven	Unknown/other/debr
R4	2	2021-09-08	19:36:58	19:39:39	50	0	5	5	5	0	0	85	0	0	13	3	0	0	0	11	9	0	1	0	0	0	0	0	10	39	0	0	1	18	2	0	0	0	0	6	0	0	0	0	0	0	0	0	3	0	0	1	0	0	1	0
R4	3	2021-09-08	19:39:39	19:42:27	40	0	5	5	5	0	0	85	0	0	17	2	1	0	0	4	0	0	0	2	0	0	0	0	7	36	0	0	3	22	1	0	1	0	0	12	1	0	1	0	0	0	0	0	0	0	0	1	0	0	4	0
R5	1	2021-09-08	19:14:00	19:17:01	50	0	5	5	5	0	0	85	0	0	18	3	1	0	0	10	1	0	0	0	0	0	0	3	5	58	0	0	1	40	1	1	0	1	0	15	2	0	0	0	0	0	0	0	1	0	0	2	0	2	0	0
R5	2	2021-09-08	19:17:01	19:20:33	50	0	5	0	5	0	0	90	0	0	19	1	0	0	0	6	8	0	0	0	0	0	0	0	0	50	0	0	5	31	5	2	0	0	0	12	1	0	1	0	0	0	0	0	3	0	0	1	0	0	0	0
R5	3	2021-09-08	19:20:33	19:20:58	8	0	0	0	0	0	0	100	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	7	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
R6	3	2021-09-08	21:14:11	21:18:52	50	0	0	5	5	0	0	90	0	0	20	0	0	0	0	15	2	0	0	4	0	0	0	3	0	28	0	0	4	31	1	0	0	1	0	4	0	1	1	0	0	0	0	0	1	0	0	2	0	0	0	0
R6	4	2021-09-08	21:18:52	21:23:20	50	0	5	5	5	0	0	85	0	0	20	0	1	0	0	10	3	0	0	1	0	0	1	1	5	38	0	0	3	28	2	0	1	4	0	6	2	0	1	0	0	0	0	0	1	0	0	4	0	0	2	0
R6	5	2021-09-08	21:23:20	21:27:34	50	0	5	5	5	0	0	85	0	0	15	3	0	0	0	8	4	0	2	4	0	0	0	1	0	12	0	0	4	33	0	1	0	1	0	0	4	0	1	0	0	0	0	1	2	0	0	1	0	0	0	0
R7	1	2021-09-08	21:54:20	21:56:22	50	0	0	5	5	0	0	90	0	0	24	1	1	0	0	20	2	0	0	2	0	0	0	0	0	46	0	0	6	19	0	1	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
R7	2	2021-09-08	21:56:22	21:58:34	50	0	5	5	5	0	0	85	0	0	17	1	3	0	0	28	4	0	0	2	0	0	0	1	0	44	0	0	5	31	0	1	0	1	0	2	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
R7	3	2021-09-08	21:58:34	21:58:55	8	0	0	0	0	0	0	100	0	0	0	0	1	0	0	4	1	0	0	2	0	0	0	0	0	6	0	0	1	5	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R8	1	2021-09-09	22:12:29	22:15:20	50	0	10	5	0	0	0	85	0	0	7	1	0	0	0	15	3	0	0	0	0	0	0	0	0	47	0	0	0	21	27	1	0	0	0	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
R8	2	2021-09-10	22:15:20	22:17:57	46	0	0	5	5	0	0	90	0	0	14	2	5	0	0	17	7	6	0	1	0	0	0	0	0	35	0	0	5	17	44	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	6	0
T1	1	2021-09-08	22:48:44	22:50:08	50	0	5	5	5	0	0	85	0	0	18	0	1	0	0	8	3	0	0	1	0	0	0	0	1	41	0	0	1	25	5	0	0	0	0	9	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
T1	2	2021-09-08	22:50:08	22:52:29	50	0	5	5	5	0	0	85	0	0	12	1	5	0	0	4	2	0	0	1	0	0	0	0	0	52	0	0	4	31	11	0	0	2	0	16	0	0	1	0	0	0	0	0	1	0	0	1	0	1	1	0
T1	3	2021-09-08	22:52:29	23:04:11	50	0	5	5	0	0	0	90	0	0	14	1	0	0	0	11	4	0	0	4	0	0	0	1	4	51	0	0	5	24	5	0	0	2	0	4	1	0	0	1	0	0	0	0	5	0	0	0	0	0	1	0
T1	4	2021-09-08	23:04:11	23:06:27	50	0	0	5	5	0	0	85	0	0	14	1	3	0	0	5	2	0	1	0	0	0	0	0	5	49	0	0	5	25	4	2	0	1	0	7	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0
T1	5	2021-09-08	23:06:27	23:06:59	17	0	0	5	0	0	0	95	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	4	9	0	0	0	2	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T2	1	2021-09-08	23:27:57	23:31:34	50	0	0	5	0	0	0	95	0	0	10	1	2	0	0	27	4	2	0	1	0	0	0	0	0	33	0	0	4	22	10	0	0	0	0	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
T2	2	2021-09-08	23:31:34	23:34:39	50	0	0	5	5	0	0	90	0	0	15	4	1	0	0	17	6	0	0	0	0	0	0	0	0	54	0	0	10	24	45	1	0	0	0	1	2	0	1	0	0	0	0	0	0	0	0	3	0	0	1	0
T2	3	2021-09-08	23:34:39	23:37:33	50	0	0	5	0	0	0	95	0	0	13	2	4	0	0	31	3	0	0	0	0	0	0	0	0	24	0	0	3	18	4	0	0	4	0	3	1	0	0	0	0	0	0	0	1	0	1	1	0	0	19	0
T2	4	2021-09-08	23:37:33	23:40:22	50	0	0	5	0	0	0	95	0	0	10	2	1	0	0	24	1	0	0	3	0	0	0	1	0	20	0	0	1	20	0	1	0	0	0	0	0	0	1	1	4	0	0	0	0	0	0	0	0	0	24	0
T2	5	2021-09-08	23:40:22	23:42:57	50	0	0	5	5	0	0	90	0	0	20	1	2	0	0	18	6	0	0	2	0	0	0	1	0	31	0	0	3	24	1	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	1	0	0	15	0
T2	6	2021-09-08	23:42:57	23:44:00	15	0	10	0	0	0	0	90	0	0	4	0	2	0	0	13	0	0	0	1	0	0	0	0	0	22	0	0	1	8	9	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0
T3	1	2021-09-08	7:24:55	7:27:03	50	0	0	5	0	0	0	95	0	0	16	2	0	0	0	10	0	0	1	3	0	0	0	1	0	24	0	0	6	16	13	2	0	0	0	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	16	0
T3	2	2021-09-08	7:27:03	7:29:44	50	0	0	5	5	0	0	90	0	0	9	0	0	0	0	26	0	0	0	0	0	0	0	0	0	24	0	0	7	19	12	1	0	0	0	2	1	0	0	0	0	0	0	0	1	0	0	0	0	0	21	0
T3	3	2021-09-08	7:29:44	7:32:40	50	0	5	5	5	0	0	85	0	0	18	1	1	0	0	13	2	0	0	4	0	0	0	0	0	45	0	0	1	28	23	2	0	0	0	4	3	0	1	0	0	0	0	0	0	0	0	0	0	0	8	0
T3	4	2021-09-08	7:32:40	7:36:10	50	0	5	0	5	0	0	90	0	0	18	0	0	0	0	18	1	0	0	2	0	0	0	0	0	26	0	0	6	19	3	0	0	3	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	33	0
T3	5	2021-09-08	7:36:10	7:39:43	50	0	5	5	0	0	0	90	0	0	10	1	0	0	0	28	1	0	0	9	0	0	0	0	0	45	0	0	3	26	31	0	0	0	0	2	0	0	0	0	0	0	0	0	2	0	0	0	0	0	32	0
T3	6	2021-09-08	7:39:43	7:43:35	50	0	5	5	5	0	0	85	0	0	15	4	0	0	0	25	0	0	0	27	0	0	0	0	0	32	0	0	7	12	9	0	0	0	0	0	2	0	1	1	1	0	0	0	1	0	0	0	0	0	18	0
T3	7	2021-09-08	7:43:35	7:48:29	50	0	5	5	0	0	0	90	0	0	17	1	0	0	0	14	0	0	0	8	0	0	0	0	0	90	0	0	0	29	25	0	0	0	0	6	1	0	0	0	0	0	0	0	1	0	0	1	0	0	14	0
T3	8	2021-09-08	7:48:29	7:52:20	50	0	0	5	5	0	0	90	0	0	26	1	0	0	0	14	7	0	0	17	0	0	0	0	0	52	0	0	3	21	3	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0
T3	9	2021-09-08	7:52:20	7:56:02	30	0	0	5	0	0	0	95	0	0	14	0	0	0	0	14	11	0	0	10	1	0	0	1	0	14	0	0	4	24	0	0	0	1	0	1	3	0	0	0	1	0	0	0	0	1	0	0	0	0	3	0
T4	1	2021-10-08	0:52:42	0:57:31	50	0	5	10	5	0	0	80	0	0	17	2	0	0	0	14	3	0	0	2	0	0	0	4	0	66	0	0	3	28	6	1	0	0	0	7	5	0	1	1	0	0	0	0	1	0	0	2	0	0	1	0
T4	2	2021-10-08	0:57:31	1:02:07	50	0	0	10	5	0	0	85	0	0	14	0	0	0	0	43	2	0	0	2	0	0	0	0	0	35	0	0	5	27	5	2	0	0	0	2	3	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0
T4	3	2021-10-08	1:02:07	1:07:38	50	0	5	0	0	0	0	95	0	0	14	1	0	0	0	29	1	0	0	1	0	0	1	2	0	44	0	0	6	27	25	2	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	13	0
T4	4	2021-10-08	1:07:38	1:12:59	50	0	0	5	5	0	0	90	0	0	14	4	2	0	0	15	5	0	0	5	0	0	0	0	0	18	0	0	7	15	0	0	1	1	0	2	4	0	1	0	0	0	0	0	0	0	0	0	0	0	68	0
T4	5	2021-10-08	1:12:59	1:17:24	50	0	0	5	0	0	0	95	0	0	14	2	1	0	0	27	2	0	0	2	0	0	0	0	0	59	0	0	6	36	3	0	0	0	0	13	1	0	0	0	0	0	0	0	2	0	0	2	0	0	59	0
T4	6	2021-10-08	1:17:24	1:22:18	50	0	0	10	0	0	0	90	0	0	13	2	4	0	0	14	2	0	0	3	0	0	0	0	0	23	0	0	3	22	35	0	0	0	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	54	0
T4	7	2021-10-08	1:22:18	1:26:34	50	0	5	0	5	0	0	90	0	0	13	1	0	0	0	9	3	0	0	4	0	0	0	0	0	44	0	1	3	25	18	1	0	0	0	2	1	0	1	0	0	0	0	0	1	0	0	1	0	0	31	0
T4	8	2021-10-08	1:26:34	1:31:30	50	0	10	5	5	0	0	85	0	0	17	0	0	0	0	11	4	0	0	8	0	0	0	0	0	48	0	0	4	22	20	2	0	0	0	2	1	0	0	0	0	0	0	0	5	0	0	1	0	0	15	0
T4	9	2021-10-08	1:31:30	1:36:58	50	0	5	10	0	0	0	85	0	0	9	3	1	0	0	16	4	0	1	6	0	0	0	0	0	59	0	0	3	21	25	1	0	3	0	12	0	0	0	0	0	0	0	0	0	0	0	1	0	0	10	0
T4	10	2021-10-08	1:36:58	1:39:43	26	0	0	5	0	0	0	95	0	0	8	0	0	0	0	6	2	0	0	0	0	0	0	2	0	44	0	0	5	33	7	0	0	0	0	6	2	0	0	1	0	0	0	0	1	0	0	1	0	0	6	0
T5	1	2021-10-08	1:52:01	2:11:25	50	0	5	5	5	0	0	85	0	0	11	1	1	0	0	1	2	0	0	1	0	0	0	4	0	17	0	0	1	16	2	0	0	0	0	2	0	0	0	0	0	0	0	0	2	0	0	0	0	2	3	0
T5	2	2021-10-08	2:11:25	2:16:51	50	0	5	5	0	0	0	90	0	0	15	0	0	0	0	4	3	0	0	4	0	0	0	4	0	9	0	0	4	23	2	0	0	0	0	0	1	0	0	0	0	0	0	0	4	0	0	2	0	0	14	0
T5	3	2021-10-08	2:16:51	2:22:11	50	0	5	5	5	0	0	85	0	0	8	1	1	0	0	5	3	0	0	4	0	0	0	1	2	49	0	1	4	17	1	0	1	1	0	16	0	0	1	0	1	0	0	0	5	0	0	2	0	0	14	0
T5	4	2021-10-08	2:22:11	2:27:16	50	0	0	5	5	0	0	90	0	0	6	5	2	0	0	9	3	1	0	1	0	0	0	2	0	18	0	0	3	16	2	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	1	0	3	22	0
T5	5	2021-10-08	2:27:16	2:41:57	50	0	5	5	5	0	0	85	0	0	15	2	2	0	0	13	3	0	0	0	0	0	0	2	0	25	0	0	4	28	2	0	0	0	0	4	0	0	0	0	0	0	0	1	1	0	0	0	0	0	17	1
T5	6	2021-10-08	2:41:57	2:47:13	50	0	5	5	5	0	0	85	0	0	16	1	2	0	0	14	3	0	0	0	0	0	0	0	5	29	0	0	4	24	6	0	1	0	0	9	1	0	0	0	0	0	0	0	1	0	0	1	0	1	2	0
T5	7	2021-10-08	2:47:13	2:52:45	50	0	5	5	0	0	0	90	0	0	11	1	1	0	0	13	3	2	0	7	0	0	0	0	0	35	0	0	6	29	0	2	1	0	0	15	0	0	0	0	0	0	0	0	1	0	0	0	0	0	3	0
T5	8	2021-10-08	2:52:45	2:58:03	50	0	0	5	5	0	0	90	0	0	13	1	3	0	0	17	2	0	0	7	0	0	0	0	2	23	0	0	9	17	0	1	0	0	0	3	0	0	1	0	0	0	0	0	0	0	0	2	0	0	5	0
T5	9	2021-10-08	2:58:03	2:58:32	5	0	0	5	0	0	0	95	0	0	3	0	2	0	0	2	0	0	0	0	0	0	0	0	0	6	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T6	1	2021-10-08	3:21:59	3:27:13	50	0	5	5	5	0	0	85	0	0	21	0	1	0	0	14	0	0	0	0	0	0	0	0	0	22	0	0	7	15	1	1	1	0	0	5	0	0	2	0	0	0	0	0	1	0	0	0	0	0	18	0
T6	2	2021-10-08	3:27:13	3:32:56	50	0	0	5	5	0	0	90	0	0	16	0	2	0	0	13	1	0	1	0	0	0	0	0	0	35	0	0	3	14	1	2	0	0	0	4	1	0	0	0	0	0	0	0	2	0	0	0	0	0	39	0
T6	3	2021-10-08	3:32:56	3:38:34	50	0	0	10	5	0	0	85	0	0	15	3	1	0	0	10	0	0	1	0	0	0	0	1	0	55	0	0	4	14	0	2	0	0	0	5	2	0	0	0	0	0	0	0	1	0	0	0	0	0	133	0
T6	4	2021-10-08	3:38:34	3:43:52	50	0	0	5	5	0	0	90	0	0	23	2	0	0	0	20	0	0	1	11	0	0	0	0	0	3	0	0	7	15	6	1	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	2	0	0	127	0
T6	5	2021-10-08	3:43:52	3:49:09	50	0	0	0	5	0	0	95	0	0	14	1	0	0	0	18	2	0	3	11	0	0	0	1	0	29	0	0	8	17	1	0	0	2	0	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	69	0
T6	6	2021-10-08	3:49:09	3:53:07	50	0	0	5	5	0	0	90	0	0	13	2	0	0	0	16	2	0	3	24	0	0	0	1	0	33	0	0	4	14	11	1	0	0	0	4	4	0	0	0	0	0	0	0	3	0	0	0	0	0	53	0
T6	7	2021-10-08	3:53:07	3:57:04	50	0	0	10	5	0	0	85	0	0	12	2	0	0	0	20	3	0	1	9	0	0	0	0	0	54	0	0	9	24	9	3	0	0	0	4	4	0	2	0	0	0	0	0	1	0	0	0	0	0	26	0
T6	8	2021-10-08	3:57:04	4:00:47	50	0	0	5	5	0	0	90	0	0	15	1	0	0	0	10	0	0	0	33	0	0	0	0	0	32	0	0	5	12	1	1	0	0	0	3	3	0	0	0	0	0	0	1	0	0	0	0	0	0	20	0
T6	9	2021-10-08	4:00:47	4:04:38	50	0	0	0	0	0	0	100	0	0	13	4	0	0	0	6	1	0	0	17	0	0	0	0	0	27	0	0	3	12	3	1	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	1	0	0	13	0

						Substrate Type (% Coverage)									Abundance																																									
															Echinoderms					Cnidaria			ophr	rthropo		neli	Mollusc		hiop	Corals					Sponges						Fish															Othe
Transect	Section	Date	Time Start	Time End	Section Length (m)	Bedrock	Boulders	Rubble	Cobble	Gravel	Sand	Mud	Organic Detritus	Shell	Ech_Sea Urchins	Ech_Sea Stars	Ech_Brittle Star	Ech_Brisingid	Ech_Basket Stars	Cni_Sea Anemones	Cni_Jellyfish	Cni_Hydroids	Cte_Ctenophores	Art_Shrimp	Art_Crab	Ann_Annelids	Mol_Gastropods	Mol_Cephalopods	Bra_Brachiopods	Soft Corals	Black Corals	Hard Corals	Branching corals	Sea Pens	Solid / Massive	Leaf / Vase Shaped	Round with Projectio	Thin-Walled, Comple	Stalked	Other	Ben_Grenadiers	Ben_Skates	Ben_Wolf Eels	Ben_Blue Hake	Pis_Greenland Halibut	Ben_Wolffish (specify	PIP_Redfish	Ben_Rockling	Ben_Longnose Eel	Ben_Eelpout	Ben_Sculpin	Pla_Lanternfish	Pis_Shark	Unk_Anguilliform (gla	Unk_Other fish (juven	Unknown/other/debr
T6	10	2021-10-08	4:04:38	4:07:00	41	0	0	5	0	0	0	95	0	0	13	1	1	0	0	15	3	0	0	17	0	0	0	0	0	27	0	0	3	13	5	0	0	0	0	0	4	0	1	1	0	0	0	0	2	0	0	0	0	0	11	0
T7	1	2021-10-08	4:16:36	4:18:54	50	0	0	5	5	0	0	90	0	0	21	1	0	0	0	5	0	0	0	7	0	0	0	3	0	37	0	0	3	24	2	1	0	0	0	5	2	0	1	0	1	0	0	0	2	0	0	0	0	1	3	0
T7	2	2021-10-08	4:18:54	4:22:55	50	0	0	5	5	0	0	90	0	0	14	1	0	0	0	6	1	0	0	10	0	0	0	1	0	16	0	0	5	21	1	0	0	1	0	0	3	0	1	0	0	0	0	1	0	0	0	1	0	0	20	0
T7	3	2021-10-08	4:22:55	4:26:53	50	0	0	5	0	0	0	95	0	0	13	1	0	0	0	7	3	1	1	13	0	0	0	4	0	25	0	0	6	21	1	0	0	0	0	3	4	0	0	0	0	0	0	1	1	0	0	2	0	1	19	0
T7	4	2021-10-08	4:26:53	4:30:38	50	0	5	5	5	0	0	85	0	0	11	0	1	0	0	6	3	0	2	8	0	0	0	4	7	48	0	0	5	16	0	0	0	1	0	11	0	0	1	0	0	0	0	0	2	0	0	0	0	0	16	0
T7	5	2021-10-08	4:30:38	4:34:51	50	0	0	5	5	0	0	90	0	0	15	0	1	0	0	10	0	0	1	9	0	0	0	4	4	30	0	0	3	21	6	0	1	0	0	7	0	0	0	0	0	0	0	0	2	0	0	0	0	1	25	0
T7	6	2021-10-08	4:34:51	4:38:43	50	0	5	5	5	0	0	85	0	0	10	3	2	0	0	10	2	0	4	5	0	0	0	3	5	26	0	0	2	17	4	4	1	1	0	12	2	0	0	0	1	0	0	0	2	0	0	0	0	0	27	0
T7	7	2021-10-08	4:38:43	4:42:52	50	0	5	5	5	0	0	85	0	0	15	1	0	0	0	7	0	0	3	4	0	0	0	6	0	37	0	0	1	16	5	0	2	0	0	6	0	0	0	0	0	0	0	1	0	0	0	0	0	0	50	0
T7	8	2021-10-08	4:42:52	4:46:45	50	0	0	5	0	0	0	95	0	0	18	1	1	0	0	5	1	0	0	7	0	0	0	5	4	19	0	0	2	16	1	0	0	0	0	7	2	0	0	0	0	0	0	0	1	0	0	1	0	0	58	0
T7	9	2021-10-08	4:46:45	4:49:59	45	0	5	5	5	0	0	85	0	0	9	0	1	0	0	4	1	0	0	6	0	0	0	4	4	53	0	0	6	9	6	0	0	0	0	4	1	0	0	0	0	0	0	2	0	0	0	0	0	0	32	0
T8	1	2021-10-08	5:16:16	5:20:35	50	0	0	5	5	0	0	90	0	0	15	4	0	0	0	2	2	0	1	6	0	0	0	3	0	20	0	0	5	9	0	2	0	0	0	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	61	0
T8	2	2021-10-08	5:20:35	5:25:08	50	0	0	5	5	0	0	90	0	0	21	0	0	0	0	4	1	0	1	0	0	0	0	0	0	25	0	0	4	21	0	0	0	1	0	7	2	1	1	0	0	0	0	0	0	0	0	0	0	0	70	0
T8	3	2021-10-08	5:25:08	5:30:29	50	0	0	0	5	0	0	95	0	0	22	3	0	0	0	10	0	0	0	0	0	0	0	1	0	8	0	0	4	17	0	0	0	0	0	2	3	0	0	0	3	0	0	0	3	0	0	0	0	0	60	0
T8	4	2021-10-08	5:30:29	5:35:51	50	0	0	5	0	0	0	95	0	0	19	1	2	0	0	16	0	0	1	0	0	0	0	1	0	20	0	0	5	21	3	0	0	2	0	0	4	0	0	0	1	0	0	0	1	0	0	0	0	0	25	0
T9	1	2021-10-08	6:05:05	6:07:48	50	0	5	5	5	0	0	85	0	0	16	0	0	0	0	5	3	0	0	1	0	0	0	2	0	24	0	0	2	21	0	0	1	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	0	0	27	0
T9	2	2021-10-08	6:07:48	6:23:11	50	0	0	0	5	0	0	95	0	0	10	0	0	0	0	11	1	0	0	7	0	0	0	4	0	6	0	0	1	18	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	11	0
T9	3	2021-10-08	6:23:11	6:26:39	50	0	0	5	0	0	0	95	0	0	33	2	1	0	0	10	0	0	0	1	0	0	0	0	0	4	0	0	0	24	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	41	0
T9	4	2021-10-08	6:26:39	6:26:58	6	0	0	0	0	0	0	100	0	0	4	1	2	0	0	5	1	0	0	1	0	0	0	0	0	0	0	0	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0