Fisheries and Oceans Canada | Pêches et Océans Canada
Ecosystems and Oceans Science | Sciences des écosystèmes et des océans

Pacific Region

Canadian Science Advisory Secretariat
Science Response 2026/029

STOCK STATUS UPDATE OF WILD GEODUCKS IN BRITISH COLUMBIA FOR 2025

CONTEXT

DFO Fisheries Management Branch has requested that Science Branch provide yearly updates of the BC wild Pacific Geoduck (*Panopea generosa*), hereafter referred to as Geoduck, (Geoduck and horse clam 2026/2027 Integrated Fisheries Management Plan) biomass estimates, stock index and stock status, in line with DFO's Precautionary Approach (DFO 2009). The purpose of this Canadian Science Advisory Secretariat (CSAS) Science Response (SR) is to summarize 2025 updates to Geoduck biomass estimates provided to fishery managers for setting Geoduck quotas for the 2026-2027 fishing season and to provide updated stock index and stock status.

This Science Response Report results from the regional peer review meeting of March 3, 2026 on the Stock Status Update of Wild Geoducks in British Columbia for 2025.

SCIENCE ADVICE

Status

- Mean Geoduck biomass on available sub-beds (i.e., not impacted by closures and not reported to be impacted by Sea Otters) on the BC coast in 2025 was estimated at 183,159 t (95% CL: 101,467 - 312,135 t). Mean total coastwide current biomass for all documented sub-beds was estimated at 240,480 t (95% CL: 124,489 - 436,516 t).
- Mean total coastwide current Geoduck biomass is above the Limit Reference Point (LRP) of 113,333 t and the Upper Stock Reference (USR) of 141,666 t. Therefore, the Geoduck stock is in the Healthy Zone.
- Based on biomass estimated in 2025 for the 2026-2027 Geoduck harvesting season, the coastwide Geoduck stock index (i.e., ratio of current biomass to unfished biomass) was 85% for all documented sub-beds on the coast; above the 50% USR. The actual Geoduck annual harvest rate, defined as the Total Allowable Catch (TAC) divided by total coastwide current biomass, for the 2026-2027 fishing season is estimated to be 0.5% of the estimated mean total coastwide current biomass and 1.0% of the estimated lower 95% confidence limit of total coastwide current biomass; below the 1.8% removal reference.

Trends

- Biomass trend data are only available since 2018 due to changes to biomass estimation methods over time.
- Biomass has been stable since the 2018 assessment.

Ecosystem and Climate Change Considerations

- Sea Otter predation on Geoducks has led to a decrease in available biomass (i.e., biomass on beds not impacted by closures and not reported to be impacted by Sea Otters) and therefore a decrease in quotas and/or reductions in the area fished in some portions of the BC coast (i.e., portions of the Central Coast and West Coast of Vancouver Island).
- Continued expansions of Sea Otter range and abundance along the BC coast (Nichol et al. 2020) is likely to lead to further declines in Geoduck biomass and reduction in quotas in the future.

Stock Advice

- The recommended regional harvest rates of 1.2 to 1.8% used in the estimation of harvest options, were selected with the management objective of keeping biomass over 50% of pre-fishery biomass over 50 years (Zhang and Hand 2007).

BASIS FOR ASSESSMENT

Assessment Details

Year Assessment Approach was Approved

2012 (Bureau et al. 2012) revised in 2014 (DFO 2014) and 2017 (Bureau 2017, DFO 2017).

Assessment Type

Full Assessment

Most Recent Assessment Date

1. Last Full Assessment: 2024 (DFO 2026b)

Stock Assessment Approach

1. Broad category: Index-based (trends in empirical indices only), single stock assessment model. Other: harvest rates derived from age-structured projection modeling, applied to yearly biomass estimates.
2. Specific category: Index-based (including fishery-dependent and fishery-independent indices).

Geoduck stock biomass is estimated following the methods presented in the Geoduck stock assessment framework (Bureau et al. 2012) and later modifications (DFO 2014; Bureau 2017; DFO 2017). Geoduck biomass is estimated annually on a by-Geoduck-sub-bed basis as the product of Geoduck density, mean weight, and sub-bed area, incorporating the latest available data (see Data section). This 2025 stock status update incorporates new data from Geoduck fishery-independent density dive surveys conducted in 2024 as well as revisions to mean weight and bed area estimates based on the 2023-2024 fishing season harvest events (fishery-dependent data). Annual harvest rates of 1.2-1.8% are applied, at the region level (i.e., Haida Gwaii, Prince Rupert, Central Coast, West Coast of Vancouver Island, Inside Waters), to current biomass estimates (Zhang and Hand 2006, 2007) to produce harvest options. Harvest options are provided at the sub-bed level to fishery managers, who then set the quotas based on management decision rules and feedback from harvesters and on-ground monitors (Bureau et al. 2012). The coastwide TAC is derived by summing the quota from available sub-beds.

Ecosystem and Climate Change Assessment Approach

Estimates of Geoduck habitat are one of the principal inputs to the biomass estimation process. Each year, harvest events from the previous fishing season are reviewed to refine bed areas (Bureau et al. 2012). Any new beds discovered or revisions to existing beds are then documented. The area of beds surveyed the previous year are also refined using the results from dive surveys that estimate Geoduck density and hydro-acoustic substrate-mapping surveys.

Geoduck beds in some areas are not harvested due to the impact of Sea Otter predation on Geoduck stocks. Beds in areas where Sea Otters are reported to have had an impact may or may not have quota assigned to them, based on feedback from harvesters.

Stock Structure Assumption

Stock overview information: The biology of Geoduck was outlined in Bureau et al. (2012) and DFO (2026a). The stock is assessed following methods described in the stock assessment framework (Bureau et al. 2012), and later modifications (DFO 2014; Bureau 2017; DFO 2017). Details of current management measures for the commercial dive fishery are provided in the Geoduck and Horse Clam Integrated Fisheries Management Plan (DFO 2026a).

Geoduck populations occur in discrete beds of soft substrate, distributed throughout the coast of British Columbia (BC). Geoducks are sedentary clams that live buried up to 1 m below the sediment surface.

Individual Geoduck beds are connected by means of planktonic larvae, and based on current knowledge, Geoduck populations form a single genetic stock along the BC coast (Miller et al. 2006; Suárez-Moo et al. 2016). Therefore, the LRP and USR are applied on a coastwide spatial scale and stock status is determined coastwide. Geoduck has been proposed as a Batch 2 for listing under the Fish Stock Provisions.

Biomass estimation and management of the fishery are conducted on the spatial scale of individual Geoduck sub-beds. Fisheries management operational control points, or harvest control rules, are applied at the individual sub-bed level, to ensure the viability of the fishery.

In 2025, there were 2,955 documented Geoduck beds on the BC coast made up of 5,244 sub-beds ranging in size from 0.03 hectares (ha) to 450.44 ha. Some beds are made up of multiple sub-beds, which are discrete patches of Geoduck habitat on the sea floor that were initially assigned a common bed code (Bureau 2017).

Reference Points

- Limit Reference Point (LRP): The LRP for BC Geoducks is defined as total coastwide current biomass being equal to 40% of the total coastwide estimated unfished biomass (Bureau 2017; DFO 2017; Zhang and Hand 2007). The LRP for the BC Geoduck stock in 2025 was estimated at 113,333 t.
- Upper Stock Reference (USR): The USR for the BC Geoduck stock is defined as total coastwide current biomass being equal to 50% of total coastwide estimated unfished biomass (DFO 2021a). The value of the USR for the BC Geoduck stock in 2025 was estimated at 141,666 t.
- Removal Reference (RR): The removal reference (maximum allowable harvest rate for the stock as a whole) for the BC Geoduck stock was defined as 1.8% of the total coastwide current Geoduck biomass estimate (DFO 2020).

- Target Reference Point (TRP): No TRPs developed for this stock.

Data

The three inputs to biomass estimation for Geoducks are bed area, density and mean weight and are updated annually for some beds. Estimation methods for these parameters are provided in Bureau et al. (2012) and DFO (2014).

Bed Area (ha)

The area of each sub-bed is estimated in GIS based on locations of fishing events, and revised based on dive survey data, and hydro-acoustic bed mapping data. The total area of documented Geoduck beds in BC, in 2025, was estimated to be 22,327 ha (Table 1). Available bed area refers to beds not impacted by closures and not reported to be impacted by Sea Otters.

Density (Geoducks/m^2)

Geoduck density is estimated from fishery-independent dive surveys. Mean density for each surveyed bed is estimated and confidence limits are estimated using bootstrapping methods (Bureau et al. 2012).

The Geoduck dive survey program started in 1992. Since then, 222 surveys have been conducted covering 73% of the total coastwide documented bed area (Tables 2 and 3). Forty-seven percent of the coastwide bed area has been surveyed more than once. Eighty-two percent of available bed area has been surveyed and 54% has been surveyed more than once.

The 2024 Geoduck density dive surveys (Figure 1) covered 105 beds representing 807 ha of area.

Mean Weight (kg)

Geoduck mean weights are estimated from commercial fishery landings data from 1997 onwards (i.e., landed weight and number of Geoducks, on a by-bed basis). Mean weights are updated annually after adding the latest year of available commercial landings data to the dataset. For Geoduck beds where insufficient data are available to estimate mean weight, the mean weight is extrapolated from nearby beds.

For beds where bed-specific estimates of mean weight are available, mean weight estimates ranged from 0.57 to 1.83 kg (Tables 2 and 4).

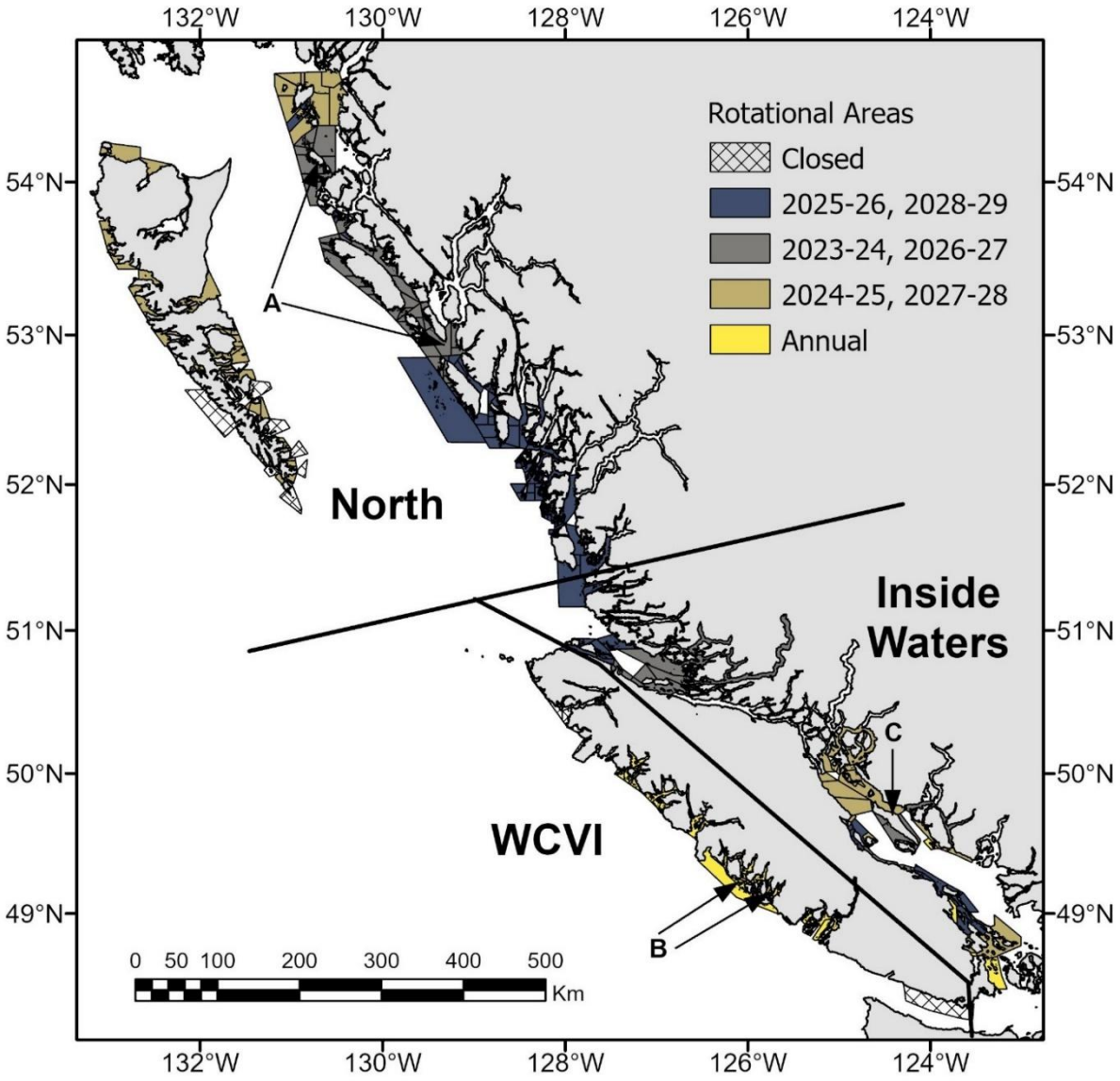


Figure 1. Map of British Columbia coast showing Geoduck "Quota Areas" (North, WCVI = West Coast of Vancouver Island, and Inside Waters, separated by solid lines) and "Rotational Areas" (different colours). Note that rotational areas are subject to change. Location of 2024 Geoduck density surveys indicated by letters: A = Stephens Island to Caamano Sound; North Coast, B = Bartlett and Indian Islands; WCVI, and C = East Texada Island; Inside Waters.

Table 1. Amount of Geoduck bed area (hectares) under various categories, by Pacific Fishery Management Area (PFMA) and coastwide. "Closures" refers to beds in parks, reserves, research closures, contamination closures, unclassified waters, management closures, or tenured for aquaculture. "Otters" refers to beds that have been reported to be impacted by Sea Otter predation (and may or may not be closed). "Available" refers to beds not impacted by closures and not reported to be impacted by Sea Otters.

	Bed Area (ha)			
PFMA	Total	Closures	Otters	Available
1	199	5	0	194
2	2,285	448	0	1,836
102	10	10	0	0
3	193	5	0	188
4	696	7	0	689
5	786	37	27	722
6	1,221	42	45	1,134
106	79	0	0	79
7	1,242	66	535	641
8	156	0	0	156
9	104	0	7	97
10	108	1	13	94
11	21	21	0	0
111	43	43	0	0
12	712	109	96	506
13	749	148	0	600
14	3,764	22	0	3,742
15	1,427	566	0	860
16	707	35	0	672
17	699	168	0	531
18	138	6	0	132
19	587	75	0	512
28	30	30	0	0
29	165	6	0	159
20	299	0	0	299
23	1,265	863	0	402
24	2,300	299	541	1,461
124	14	0	0	14
25	1,039	3	1,033	3
26	612	198	390	24
27	679	0	679	0
Coastwide	22,327	3,214	3,366	15,746

Table 2. Current Geoduck density (mean by bed, range, and mean weighted by bed area) on surveyed beds, number of beds and bed area surveyed, by Pacific Fishery Management Area (PFMA) from fishery-independent dive surveys. Geoduck mean weight by PFMA, from commercial harvest data for beds where bed-specific mean weight data are available. 23 is open portions of PFMA 23 and 23 CL is Area 23 Closures (i.e., beds in the Pacific Rim National Park Reserve and Bamfield Marine Sciences Centre closures).

PFMA	Number of Surveyed Beds	Density (Geoducks/m2)			Bed Area Surveyed (ha)	Mean Geoduck Weight (kg)
		Mean by bed	Range	Mean weighted by bed area		
1	3	0.28	(0.23-0.36)	0.28	100	1.15
2	346	1.69	(0.00-5.25)	1.52	1,892	1.23
102	-	-	-	-	-	-
3	21	1.44	(0.24-4.2)	1.74	173	1.07
4	146	3.21	(0.44-11.09)	3.17	629	1.15
5	132	2.12	(0.24-6.33)	2.77	729	1.12
6	281	2.59	(0.23-12.04)	2.49	1,174	1.09
106	15	3.97	(2.06-6.99)	4.22	73	1.12
7	363	2.28	(0.09-10.42)	2.00	977	1.07
8	27	2.64	(0.66-6.37)	2.31	133	1.12
9	20	0.55	(0.25-0.91)	0.68	61	1.08
10	40	0.99	(0.12-2.32)	1.17	94	0.92
11	-	-	-	-	-	-
111	-	-	-	-	-	-
12	45	1.00	(0.09-2.69)	0.77	484	1.19
13	23	0.13	(0.04-0.33)	0.15	640	1.07
14	27	0.20	(0.04-0.57)	0.15	3,679	1.19
15	11	0.16	(0.04-0.48)	0.12	752	1.00
16	35	0.51	(0.07-1.43)	0.45	605	1.01
17	12	0.53	(0.09-1.6)	0.27	349	1.05
18	3	1.15	(0.84-1.34)	0.88	78	1.05
19	-	-	-	-	-	1.29
28	-	-	-	-	-	-
29	3	0.62	(0.45-0.85)	0.53	31	0.93
20	-	-	-	-	-	-
23	42	0.82	(0.24-1.75)	0.79	369	1.03
23 CL	49	1.75	(0.35-4.06)	1.84	447	1.10
24	49	1.30	(0.05-6.28)	1.01	2,112	1.06
124	-	-	-	-	-	-
25	8	0.48	(0.00-1.28)	0.23	253	0.91
26	6	0.50	(0.31-0.94)	0.82	210	0.92
27	10	0.30	(0.04-0.65)	0.25	202	0.98
Coastwide	**1,717**	**1.97**	**(0.00-12.04)**	**1.10**	**16,247**	**1.11**

Table 3. Number and percentage of surveyed Geoduck beds and bed area within different mean current density categories, coastwide.

Mean Current Density Geoducks/m^2	Surveyed Beds		Cumulative % Number	Bed Area		Cumulative % Area
	Number	%		Hectares	%	
0 to <1	614	35.8	35.8	10,483	64.5	64.5
1 to <2	476	27.7	63.5	3,035	18.7	83.2
2 to <3	281	16.4	79.8	1,164	7.2	90.4
3 to <4	147	8.6	88.4	777	4.8	95.2
4 to <6	133	7.7	96.2	554	3.4	98.6
6 to <8	42	2.4	98.6	185	1.1	99.7
≥8	24	1.4	100.0	49	0.3	100.0

Table 4. Number and percentage of Geoduck beds and bed area within different mean weight ranges (for beds where bed-specific mean weight data [from commercial harvest] are available).

Mean Geoduck Weight (kg)	Beds		Cumulative % Number	Bed Area		Cumulative % Area
	Number	%		Hectares	%	
<0.5	0	0.0	0.0	0	0.0	0.0
0.5 to <1.0	243	24.0	24.0	3,692	22.0	22.0
1.0 to <1.5	755	74.5	98.4	12,924	77.2	99.2
1.5 to <2.0	16	1.6	100.0	132	0.8	100.0
≥2.0	0	0.0	100.0	0	0.0	100.0

ASSESSMENT

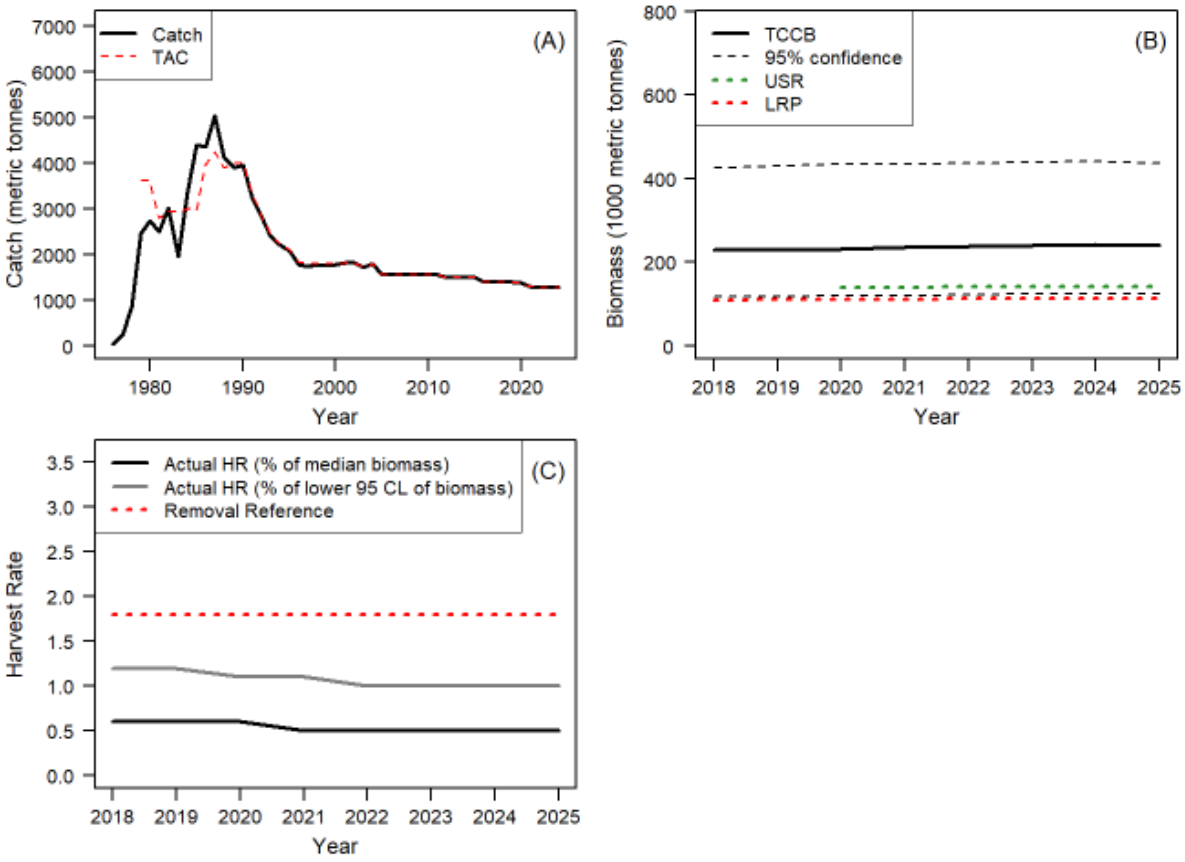


Figure 2. (A) Catch and Total Allowable Catch (TAC) in metric tonnes, (B) Total coastwide current biomass (TCCB, in 1,000 metric tonnes) in relation to the Limit Reference Point (LRP; 113,333 t) and Upper Stock Reference (USR; 141,666 t), (C) Actual annual harvest rate (TAC/biomass) in relation to the Removal Reference (RR).

Stock Status and Trends

Catch vs TAC

Commercial catch has been consistently in line with the TAC since 1989 (Figure 2A) when 100% dockside validation of commercial landings by a third-party service provider was implemented. The TAC was relatively stable between 1996 and 2004, but has since seen several decreases, mainly due to the implementation of closures (e.g., Gwaii Haanas National Marine Conservation Area Reserve) and the impacts of Sea Otter predation (DFO 2021b).

Biomass

Geoduck biomass is reported by Pacific Fishery Management Area (PFMA), for several categories of sub-beds (Table 5). Geoduck biomass on available sub-beds on the BC coast in 2025 was estimated at 183,159 t (95% CL: 101,467 –312,135 t). Total coastwide current biomass for all documented sub-beds was estimated at 240,480 t (95% CL: 124,489 – 436,516 t). The estimated mean Geoduck biomass is above the LRP of 113,333 t and the USR of 141,666 t. Therefore, the Geoduck stock is in the Healthy Zone.

The low 95% confidence limit of biomass is between the USR and LRP, there is therefore a low probability that the biomass is below the USR.

Trends data are only available since the 2018 assessment for the 2019-2020 harvest season due to changes to biomass estimation methods over time. Biomass since 2018 has been stable (Figure 2B).

Table 5. Estimated Geoduck current biomass (mean; metric tons), by Pacific Fishery Management Area (PFMA) and coastwide, for sub-beds that are available, reported to be impacted by Sea Otter predation by harvesters (may or may not be open), impacted by closures and total. 95% CLs are low and high 95% confidence limits.

	Biomass (metric tons)					
	Available		Otters	Closures	Total	
PFMA	Mean	95% CLs	Mean	Mean	Mean	95% CLs
1	1,206	298 – 3,511	0	54	1,259	304 - 3,698
2	33,941	18,367 - 57,458	0	7,506	41,447	21,497 - 72,038
102	0	-	0	144	144	18 - 502
3	3,588	1,704 - 6,360	0	15	3,602	1,710 - 6,386
4	24,113	14,246 - 37,633	0	116	24,229	14,296 - 37,885
5	22,793	14,032 - 34,124	455	281	23,529	14,485 - 35,359
6	31,594	16,655 - 51,526	882	374	32,850	17,210 - 53,865
106	3,541	1,794 - 5,582	0	0	3,541	1,794 - 5,582
7	13,594	5,865 - 27,407	11,546	438	25,578	10,912 - 52,987
8	3,983	1,819 - 7,413	0	0	3,983	1,819 - 7,413
9	936	346 - 2,853	119	0	1,055	372 - 3,302
10	1,010	384 - 2,038	128	4	1,141	413 - 2,612
11	0	-	0	230	230	24 - 625
111	0	-	0	153	153	0 - 633
12	4,735	2,035 - 8,747	1,359	953	7,046	3,067 - 14,024
13	1,027	602 - 2,068	0	289	1,315	754 - 2,988
14	6,282	4,450 - 8,985	0	66	6,348	4,490 - 9,156
15	1,415	506 - 5,095	0	810	2,225	824 - 8,267
16	2,735	1,737 - 4,983	0	96	2,831	1,784 - 5,236
17	1,399	761 - 3,618	0	491	1,890	866 - 6,080
18	829	527 - 1,472	0	9	838	529 - 1,519
19	987	242 - 5,511	0	193	1,180	281 - 6,815
28	0	-	0	57	57	12 - 386
29	365	154 - 1,252	0	11	376	157 - 1,320
20	744	0 - 2,842	0	0	744	0 - 2,842
23	3,557	1,845 - 5,630	0	17,208	20,765	8,765 - 35,532
24	18,427	13,000 - 25,105	4,468	1,237	24,133	16,584 - 33,970
124	201	10 - 651	0	0	201	10 - 651
25	38	14 - 57	3,221	7	3,266	312 - 11,600
26	122	74 - 214	1,826	630	2,578	933 - 6,759
27	0	-	1,947	0	1,947	269 - 6,485
Coastwide	**183,159**	**101,467 - 312,135**	**25,951**	**31,369**	**240,480**	**124,489 - 436,516**

Stock Index

The stock index is defined as the ratio of total coastwide current biomass to total coastwide unfished biomass and is estimated for the Geoduck stock as a whole (Bureau 2017; DFO 2017). The coastwide stock index is re-estimated yearly when biomass estimates are updated. Based on biomass estimated in 2025 for the 2026-2027 Geoduck harvesting season, the coastwide Geoduck stock index was 85% for all documented sub-beds on the coast; above the 50% USR.

The stock index has been consistently above the USR since status started being assessed against the references points in the 2018 BC Geoduck Stock Status Update (DFO 2020).

Removal reference

The TAC for the BC commercial Geoduck fishery for the 2026-2027 fishing season was set at 1,247 t by fishery managers (DFO 2026a); which is below the sum of the lower 95% confidence limit of harvest options for all available Geoduck sub-beds in BC (1,725 t).

Although regional annual harvest rates of 1.2 to 1.8% are used in estimating harvest options (Zhang and Hand 2007) for each Geoduck sub-bed, the actual annual harvest rate, defined as the TAC divided by biomass, for the BC Geoduck stock as a whole is lower. The actual annual harvest rate is calculated at the coastwide level and is compared to the removal reference (maximum allowable harvest rate for the stock as a whole), in order to assess status. The actual Geoduck annual harvest rate, for the 2026-2027 fishing season will be 0.5% of the estimated mean total coastwide current biomass and 1.0% of the estimated lower 95% confidence limit of total coastwide current biomass, which is below the removal reference of 1.8%.

The actual Geoduck annual harvest rate has been consistently below the removal reference since status started being assessed against the references points in the 2018 BC Geoduck Stock Status Update (DFO 2020) (Figure 2C).

Current Status

Geoduck total coastwide current biomass is above the LRP and USR, and the actual annual harvest rate is below the removal reference. Therefore, the Geoduck stock is in the Healthy Zone. The Geoduck stock has been consistently in the Healthy Zone since status started being assessed against the references points in the 2018 BC Geoduck Stock Status Update (DFO 2020).

History of Management; TAC and Landings

The BC commercial Geoduck fishery began in 1976 and has since grown to be one of the highest valued fisheries in BC, estimated at approximately CAD $53 million for the 2024-2025 fishing season. Geoducks are hand-picked by divers using surface-supply gear. Individual Geoducks are extracted from the sea bed using a hand held water jet, pumped from the surface. Divers typically harvest Geoducks between 3 m and 20 m in depth. The management and stock assessment history for the BC Geoduck fishery were described in detail in Hand and Bureau (2012) and Bureau et al. (2012). Details of current management measures are provided in the Geoduck and Horse Clam Integrated Fisheries Management Plan (DFO 2026a).

For TAC and landings history see Catch vs TAC section above.

The BC Geoduck fishery is managed with a total allowable catch, individual vessel quotas, scheduled openings, area quotas and bed-specific quotas (DFO 2026a). It operates on a three year spatial rotation in the North Coast and portions of the Inside Waters areas, while the West Coast of Vancouver Island area is fished annually (Figure 1).

Harvest Options

Since 2007, harvest options have been based on estimates of current biomass and recommended regional annual harvest rates of 1.2–1.8% (Zhang and Hand 2006, 2007). Harvest options are estimated for each individual sub-bed by applying the regional harvest rate to estimates of current biomass (Bureau et al. 2012). Harvest options for portions of the coast under a three year rotation are three times the annual rate once every three years.

Ecosystem and Climate Change Considerations

Bed Area

The total area of documented Geoduck beds in BC was estimated to be 22,327 ha, of which 15,746 ha are potentially available to commercial harvest over three rotations (Table 1). Beds that were impacted by closures represented 3,214 ha (14%) of the bed area on the BC coast (Table 1).

Sea Otters

Geoducks are one of a wide variety of marine invertebrates preyed upon by Sea Otters (*Enhydra lutris*), however the impact of this predation is difficult to quantify because dietary specialization of Sea Otters develops based on occupation time, sex and reproductive status, and habitat type (Rechsteiner et al. 2019).

Geoduck beds in some areas are not harvested due to the impact of Sea Otter predation on Geoduck stocks. Beds reported to be impacted by Sea Otter predation represented 3,366 ha (15%) of the bed area on the BC coast (Table 1), and 11% of Geoduck total coastwide current biomass is reported to be impacted by Sea Otter predation (Table 5). Beds in areas where Sea Otters are reported to have had an impact may or may not have quota assigned to them.

Ocean Conditions

In the past, Geoduck growth had a positive correlation with sea surface temperature (Black et al. 2009, Edge et al., 2021). However, it is unknown how Ocean Acidification (OA) will affect Geoducks in the future. The effect of OA stress exposure on Geoducks is life-stage dependent. While juvenile Geoduck have shown positive carryover effects after exposure to OA conditions, including increased respiration rates, organic biomass and shell size (Gurr et al. 2020, Gurr et al. 2021), larval performance is negatively impacted under OA exposure with elevated energetic demand on Geoduck larvae, resulting in delayed development and disruptions to normal molecular developmental pathways (Timmins-Schiffman et al. 2019).

Future Scenarios

Although the total area of Geoduck beds on the BC coast has remained stable (~22,000 Ha), the amount of Geoduck bed area available for commercial harvest has been decreasing over time due to marine spatial planning initiatives, fishery closures and the impact of Sea Otters. Additional spatial closures (e.g., marine protected areas) are expected along the BC coast in coming years and may result in further loss of access to some Geoduck fishing grounds for the commercial fishery. The range of Sea Otters along the BC coast is expanding (Nichol et al. 2020) and they are likely to impact Geoducks in other parts of the coast in the future, therefore, continued range expansion will likely lead to decreased abundance of Geoducks (Zhang and Hand 2007). Both these factors are likely to lead to reduced quotas and TAC in the future.

SOURCES OF UNCERTAINTY

Because the locations of Geoduck beds are delineated primarily from fishery-dependent data, i.e., the location of commercial harvest events, only areas where Geoducks are commercially harvestable are documented. Geoduck beds therefore do not represent a full inventory of locations where Geoducks occur on the BC coast.

Only Geoducks large enough to be counted by survey divers (approximately 5 years and older) are included in the density estimates and therefore biomass estimates do not include Geoducks younger than five years. Geoducks extend to shallower and/or greater depths than where harvest takes place in many locations. The biomass of Geoducks outside of documented Geoduck beds, including the portion of the population that exists deeper than harvestable depths, is unknown. Therefore, the actual Geoduck biomass in BC is greater than the biomass estimates presented here.

An additional margin of safety for Geoduck conservation exists because portions of the Geoduck stock are sheltered from harvest, due to closures or water quality. Some beds are located in areas that fall under a variety of closure types (contamination closures, parks, research closures, management closures, etc.), and some beds are in areas where water quality is unclassified or classified as prohibited or restricted by Environment and Climate Change Canada and thus cannot be harvested. Some Geoducks exist in areas that are un-harvestable due to substrate characteristics.

Geoduck surveys occur in different portions of the BC coast each year and only a portion of the beds are surveyed each year. Due to the size of the BC coast and extensive number of Geoduck beds there may be several years between repeat surveys in a given area. On average 962 ha are surveyed annually and 807 ha were surveyed in 2024. Therefore, each year, density estimates are updated for some beds.

Estimates of sub-bed area and mean weights are also updated annually for some sub-beds. Although harvest is accounted for in biomass estimations, changes in biomass from year to year also reflect increased or updated knowledge for portions of the stock and may therefore not be reflective of stock trends over time.

Few surveys have been conducted in areas impacted by Sea Otters. Density estimates in some of these areas may be outdated, consequently, there is greater uncertainty in the biomass estimates in these areas.

It is unclear how the spatial closures that are expected along the BC coast in coming years may impact future assessments.

Population connectivity between beds and source/sink dynamics are not well understood.

The LRP recommended by Zhang and Hand (2007) may not meet the definition of LRP under the Precautionary Approach Framework (DFO 2009), i.e., “the point below which serious harm is occurring to the stock”. Because of the absence of Sea Otters from the BC coast for nearly a century, some believe that Geoduck abundance at the beginning of the fishery may have been at a historical high. It is therefore possible that the point below which serious harm would occur to the stock is actually lower than the LRP currently in use for the Geoduck fishery. In the future, DFO intends to review the LRP for Geoduck to align more fully with the intent of the Precautionary Approach Framework (DFO 2009) as the point below which serious harm occurs to the stock.

LIST OF MEETING PARTICIPANTS

Participant	Affiliation
Dominique Bureau	DFO Science, Pacific Region
Erin Porszt	DFO Science, Pacific Region
Brendan Aulthouse	DFO Science, Pacific Region
Pauline Ridings	DFO Fisheries Management, Pacific Region
Erin Wylie	DFO Fisheries Management, Pacific Region
Ken Fong	DFO Science, Pacific Region (Chair)
Jessica Finney	DFO Science, Pacific Region

SOURCES OF INFORMATION

Black, B.A., Copenheaver, C.A., Frank, D.C., Stuckey, M.J., and Kormanyos, R.E. 2009. Multi-proxy reconstructions of northeastern Pacific sea surface temperature data from trees and Pacific geoduck. Palaeogeogr. Palaeoclimatol. Palaeoecol. 278: 40-47.

Bureau, D. 2017. Update to estimation methods for Geoduck (*Panopea generosa*) stock index. DFO Can. Sci. Advis. Sec. Res. Doc. 2017/070. ix + 55 p.

Bureau, D., Hand, C.M., and Hajas, W. 2012. Stock Assessment Framework for the British Columbia Geoduck Fishery, 2008. DFO Can. Sci. Advis. Sec. Res. Doc. 2011/121. vii + 79 p.

DFO. 2009. A fishery decision-making framework incorporating the precautionary approach.

DFO. 2014. Effects of Geoduck biological sample handling and transport time on mean weight estimation. DFO Can. Sci. Advis. Sec. Sci. Resp. 2014/046.

DFO. 2017. Update to estimation methods for Geoduck (*Panopea generosa*) stock index. DFO Can. Sci. Advis. Sec. Sci. Resp. 2017/037.

DFO. 2020. 2018 Stock status update of British Columbia wild Geoduck. DFO Can. Sci. Advis. Sec. Sci. Resp. 2020/054.

DFO. 2021a. 2020 Stock Status Update of British Columbia Wild Geoduck. DFO Can. Sci. Advis. Sec. Sci. Resp. 2021/035.

DFO. 2021b. Integrated Fisheries Management Plan. Geoduck and Horseclam. May 1, 2021 to April 30, 2022.

DFO. 2026a. Integrated Fisheries Management Plan. Geoduck and Horseclam. April 15, 2026 to April 14, 2027.

DFO. 2026b. Stock Status Update of Wild Geoducks in British Columbia for 2024. DFO Can. Sci. Advis. Sec. Sci. Resp. 2026/001.

Edge, D.C., Reynolds, D.J., Wanamaker, A.D., Griffin, D., Bureau, D., Outridge, C., Stevick, B.C., Weng, R., and Black, B. 2021. A multicentennial proxy record of Northeast Pacific sea surface temperatures from the annual growth increments of *Panopea generosa*. Paleoceanogr. Paleoclimatol. 36: 1-20.

Gurr, S.J., Vadopalas, B., Roberts, S.B., and Putnam, H.M. 2020. Metabolic recovery and compensatory shell growth of juvenile Pacific geoduck *Panopea generosa* following short-term exposure to acidified seawater. Conserv. Physiol. 8: 1-14.

Gurr, S.J., Trigg, S.A., Vadopalas, B., Roberts, S.B., and Putnam, H.M. 2021. Repeat exposure to hypercapnic seawater modifies growth and oxidative status in a tolerant burrowing clam. J. Exp. Biol. 224: 1-9.

Hand, C.M., and Bureau, D. 2012. Stock Assessment Framework for the British Columbia Geoduck Fishery, 2002. DFO Can. Sci. Advis. Sec. Res. Doc. 2011/120. vi + 33 p.

Miller, K.A., Supernault, K.J., Li, S., and Withler, R.E. 2006. Population structure in two marine invertebrate species (*Panopea abrupta* and *Strongylocentrotus franciscanus*) targeted for aquaculture and enhancement in British Columbia. J. Shellfish Res. 25: 33–42.

Nichol, L.M., Doniol-Valcroze, T., Watson J.C., and Foster, E.U. 2020. Trends in growth of the sea otter (*Enhydra lutris*) population in British Columbia 1977 to 2017. DFO Can. Sci. Advis. Sec. Res. Doc. 2020/039. vii + 29 p.

Rechsteiner, E.U., Watson, J.C., Tinker, M.T., Nichol, L.M., Morgan Henderson, M.J., McMillan, C.J., DeRoos, M., Fournier, M.C., Salomon, A.K., Honka, L.D., and Darimont, C.T. 2019. Sex and occupation time influence niche space of a recovering keystone predator. Ecol. Evol. 9: 3321-3334.

Suárez-Moo, P.D., Gilbert-Horvath, E.A., Vadopalas, B., Calderón-Aguilera, L.E., Garza, J.C., and Rocha-Olivares, A. 2016. Genetic homogeneity of the geoduck clam *Panopea generosa* in the northeast Pacific. Biochem. Syst. Ecol. 65: 66–71.

Timmins-Schiffman, E., Guzmán, J.M., Thompson, R.E., Vadopalas, B., Eudeline, B., and Roberts, S.B. 2019. Dynamic response in the larval geoduck (*Panopea generosa*) proteome to elevated pCO2. Ecol. Evol. 10: 185-197.

Zhang, Z., and Hand, C. 2006. Recruitment patterns and precautionary exploitation rates for Geoduck (*Panopea abrupta*) population in British Columbia. J. Shellfish Res. 25: 445–453.

Zhang, Z., and Hand, C. 2007. Determination of Geoduck Harvest Rates Using Age-structured Projection Modelling. DFO Can. Sci. Advis. Sec. Res. Doc. 2007/064. iv + 49 p.

THIS REPORT IS AVAILABLE FROM THE:

Centre for Science Advice (CSA)
Pacific Region
Fisheries and Oceans Canada
3190 Hammond Bay Road
Nanaimo, BC V9T 6N7

E-Mail: DFO.PacificCSA-CASPacifique.MPO@dfo-mpo.gc.ca
Internet address: www.dfo-mpo.gc.ca/csas-sccs/

ISSN 1919-3769
ISBN 978-1-100-00430-3 Cat. No. Fs70-6/2026-029E-PDF
© His Majesty the King in Right of Canada, as represented by the Minister of the Department of Fisheries and Oceans, 2026

This report is published under the Open Government Licence - Canada

Correct Citation for this Publication:

DFO. 2026. Stock Status Update of Wild Geoducks in British Columbia for 2025. DFO Can. Sci. Advis. Sec. Sci. Resp. 2026/029.

Aussi disponible en français :

MPO. 2026. Mise à jour de 2025 sur l'état des stocks de panopes sauvages en Colombie-Britannique. Secr. can. des avis sci. du MPO. Rép. des Sci. 2026/029.