Supplementary Materials

Table S1. Inventory of anthropogenic pressures on the Algerian coast

Pressure	Inventory item	Source
Industry	5,242 industrial units in coastal provinces in 1998 (51% of the national total)	Kacemi (2006) [120]
Industry	38% of all industries and >60% of the most polluting activities in coastal zones (2024)	National Strategy for the Blue Economy [42]
Desalination	~11 plants in the early 2000s	Algerian Desalination Company (2025) [43]
Desalination	Up to 43 plants projected by 2019	Mehtougui et al. (2015) [60]
Desalination	17 major operational plants; ~20 including recently commissioned and smaller regional plants	Kadi (2026); IEA (2023) [61,63]
Desalination	Five reverse-osmosis plants commissioned in 2025 (Fouka 2, Cap Djinet 2, El Tarf, Béjaïa, Oran), ~300,000 m³/day each; Magtaa (Oran), 500,000 m³/day , total count of 19 major operational plants	Algerian Desalination Company (2025) [43] Ministry of Hydrocarbons and Mines[44]
Wastewater	Fewer than 50 treatment plants in 2000	APS (2014) [47]
Wastewater	~234 treatment plants in 2025	Les Enjeux Éco (2025) [48]
Wastewater	More than 60% of treated wastewater reused for irrigation in some provinces (2020)	Zeroual (2019) [52]
Agriculture	Utilized agricultural area ≈ 19.5% of the national territory (2021)	Ministry of Agriculture and Rural Development (2021) [57]
Agriculture	~400 active pesticide substances, ~7,000 commercial formulations marketed annually	Gouri et al. (2024) [58]
Phosphogypsum	ASMIDAL complex (Annaba): ~500,000 t/year produced; ~2,500 t/day estimated to be discharged to the sea	Benamar (1995) [66]
Ports and shipping	Twelve commercial ports; three dedicated to hydrocarbon exports (Skikda, Arzew, Béjaïa)	Tayeb et al. (2015) [65]
Ports and shipping	~10,000 vessels call at Algerian ports annually, including ~1,300 tankers; ~2,000 vessels/year (~150 million t of oil) transit 20 nautical miles offshore	Tayeb et al. (2015) [65]
Oil spills	1 Feb 2002: simultaneous grounding of three vessels (Vallebruna, Alliance Spirit, Keymar)	As cited in the manuscript
Oil spills	18 May 2006: LNG Tellier hull breach at Skikda; polluted ballast water released into the port basin, quickly contained	As cited in the manuscript
Oil spills	26 June 2006: 63 t of crude oil spilled while loading the Iran Abadeh, Skikda	As cited in the manuscript
Oil spills	2013: leak from petrochemical platform facilities produced a crude oil slick off the beaches of Skikda	El Watan (2013), cited in Haddoum (2015) [64]

Table S2. Per-study methodological metadata (analytical technique, tissue, CRM use, LOD, sampling season, size range and weight basis) for the studies pooled in the synthesis.

Study	Region	Station	Analytical technique	Tissue	CRM used	LOD reported	Sampling season / period	Size range	Basis
Abderrahmani et al. (2020) [81]	Central	Sercouf - Algiers Harbor	ICP-MS (Agilent 7700x)	Soft tissue	Yes (IAEA–MESL ILC-TE/BIOTA 2017)	No	Four seasons (June 2015 – May 2016)	50.12 – 64.75 mm	DW
Abderrahmani et al. (2023) [84]	Central	Algiers Fishing Harbour - Rocher Lily	ICP-MS (Agilent 7700x)	Soft tissue	Yes (AIEA-MESL-ILC-TE/BIOTA 2017)	No	All 4 seasons (Jan, May, Jun, Sep 2022)	30 – 60 mm	DW
Arabi & Djemaoun (2021) [83]	Central	Berrard Farm - Cultmare	AAS (Spectrophotométrie d'absorption atomique - SAA)	Soft tissue	No	No	Spring (February – May 2021)	35 – 87 mm	DW
Baghdad et al. (2015) [92]	West	Oran Harbour	AAS (Atomic Absorption Spectrometry)	Soft tissue	No	No	February – July 2010 (Spring/Summer)	20 – 70 mm	DW
Benali et al. (2016) [87]	West	Bouzedjar Beach-Oran harbor	AAS (Perkin Elmer Analyst- 100) (Flame atomic absorption	Gills, digestive gland,	No	No	Winter 2014	41 ± 8 mm	DW

			spectrophotometer with graphite furnace)	mantle (separate organs)					
Benhalima et al. (2025) [22]	Central	Figuier - Algiers Fishing Harbour	ICP-MS (Perkin Elmer Nex- ION 300x)	Soft tissue	Yes (NIST 1568a and V463)	No	spring 2018	38.5 – 92.3 mm	DW
Bennaoum et al. (2025) [89]	West	Kristel	FAAS (Perkin Elmer AAnalyst-100)	Soft tissue	Yes (unspecified)	No	All 4 seasons (June 2023 – May 2024)	Not reported	WW
Benzaoui et al. (2015) [86]	To confirm	Aïn Defla- Fort Lamoune	Flame Spectrometry (for Cd and Pb) / CV-AAS	Soft tissue	Yes (SRM 2976 Mussel Tissue)	No	Spring (May 2011)	40 ± 10 mm (as 4 ± 1 cm)	DW
Boukri & Rezzeli (2019) [79]	Central	Bateau Cassé- Tigzirt	AAS (Spectrophotométrie d'absorption atomique - SAA)	Soft tissue	No	No	Spring and Summer 2019	28.2 – 77.2 mm	DW
Drif et al. (2012) [51]	East	El Heneya- Rizi Amor	AAS (Spectrophotométrie d'absorption atomique)	Soft tissue	No	No	Winter (January 2005) & Summer (July 2005)	60 – 62 mm	DW
Guendouzi (2019); Guendouzi et al. (2020) [20,75]	East	Sercouf- collo	AAS (Graphite furnace for Pb/Cd; Flame for Cu/Zn)	Soft tissue	Yes (IAEA-MEL-2012-02 PT clam tissue)	No	Spring (April 2017)	19.9 – 87.3 mm	DW
Guendouzi et al. (2016, 2017) [19,78]	To confirm	Bateau Cassé- Willis	AAS (Atomic Absorption Spectrophotometry)	Soft tissue	Yes (Biota, IAEA-MEL-2012- 02)	No	All 4 seasons (Nov 2013 – Aug 2014)	45 ± 5 mm (as 4.5 ± 0.5 cm)	DW
Isli & Bacha (2020) [94]	Central	Algiers Fishing Harbour	AAS (Spectrophotométrie d'absorption atomique - SAA)	Soft tissue	No	No	Spring 2020	Not reported	DW
Khedimallah & Roula (2016) [73]	East	Oued Zhour - Sidi Abdelaziz	AAS	Total body pool	No	No	Spring (April – May 2016)	30 – 50 mm (as 3 – 5 cm)	DW
Laredj et al. (2012) [74]	East	Rabta- Ziama Mansouriah Harbor	AAS (Spectrophotométrie d'absorption atomique)	Soft tissue	No	No	Spring (May only)	Not reported	DW
Moumene (2017) [82]	To confirm	Sercouf- Algiers Harbor	AAS (Spectrophotométrie d'absorption atomique - Hitachi)	Soft tissue	No	No	Spring (April – May 2017)	<30 mm and >30 mm (except Algiers Port: <50 mm and >50 mm)	DW
Nakib et al. (2026) [55]	East	Skikda	ICP-OES (PerkinElmer OP- TIMA 8000)	Soft tissue	Yes (IAEA-407 fish tissue)	Yes (Cd: 0.0333, Pb: 0.0117 mg/kg ww)	Winter to Summer (February – August 2018)	Not reported	WW
Righi (2021) [80]	Central	Bateau Cassé- Algiers Harbor	AAS (Spectrophotométrie d'absorption atomique - SAA)	Soft tissue	No	No	Spring 2021	28.2 – 77.2 mm	WW

Rouabhi (2020) [93]	West	Oran Harbour	FAAS / GF-AAS (Perkin Elmer AAnalyst-100)	Soft tissue	Yes (IAEA SRM 2976)	No	All 4 seasons (Feb, May, Aug, Nov 2010)	30 – 60 mm	WW
Rouane (2012) [90]	West	Oran Harbour	FAAS / GF-AAS (Perkin Elmer AAnalyst-100)	Soft tissue	Yes (NIST SRM 2976 Mussel Tissue)	No	Autumn (November 2009 & 2010)	Not reported	DW
Rouane (2015) [85]	West	Aïn Defla - Oran Harbor	FAAS / GF-AAS (Perkin Elmer AAnalyst-100)	Soft tissue	Yes (NIST SRM 2976 Mussel Tissue)	No	All 4 seasons (Feb, May, Aug, Nov 2010)	Not reported	DW
Sabrina et al. (2025) [77]	East	Annaba	AAS (Spectrophotométrie d'absorption atomique - SAA)	Soft tissue	YES (Not specified)	No	Winter (2023)	Up to 86 mm	WW
Taleb et al. (2007) [36]	West	Oran Harbour	Flame Atomic Absorption Spectrometry (FAAS) (Pye- UNICAM SP 9)	Soft tissue	Yes (IAEA-350, Tuna fish biological standard)	No	Summer (July–September 2000)	Not reported	DW
Tires & Hebbar (2021) [88]	West	Arzew - Kristel	FAAS (Analyst-100 Spectrophotometer)	Soft tissue	Yes (Mussel Tissue SRM 2976, NIST)	No	All 4 seasons (Feb, May, Aug, Nov 2016)	11.9 – 189.8 mm (as 1.19 – 18.98 cm)*	DW