



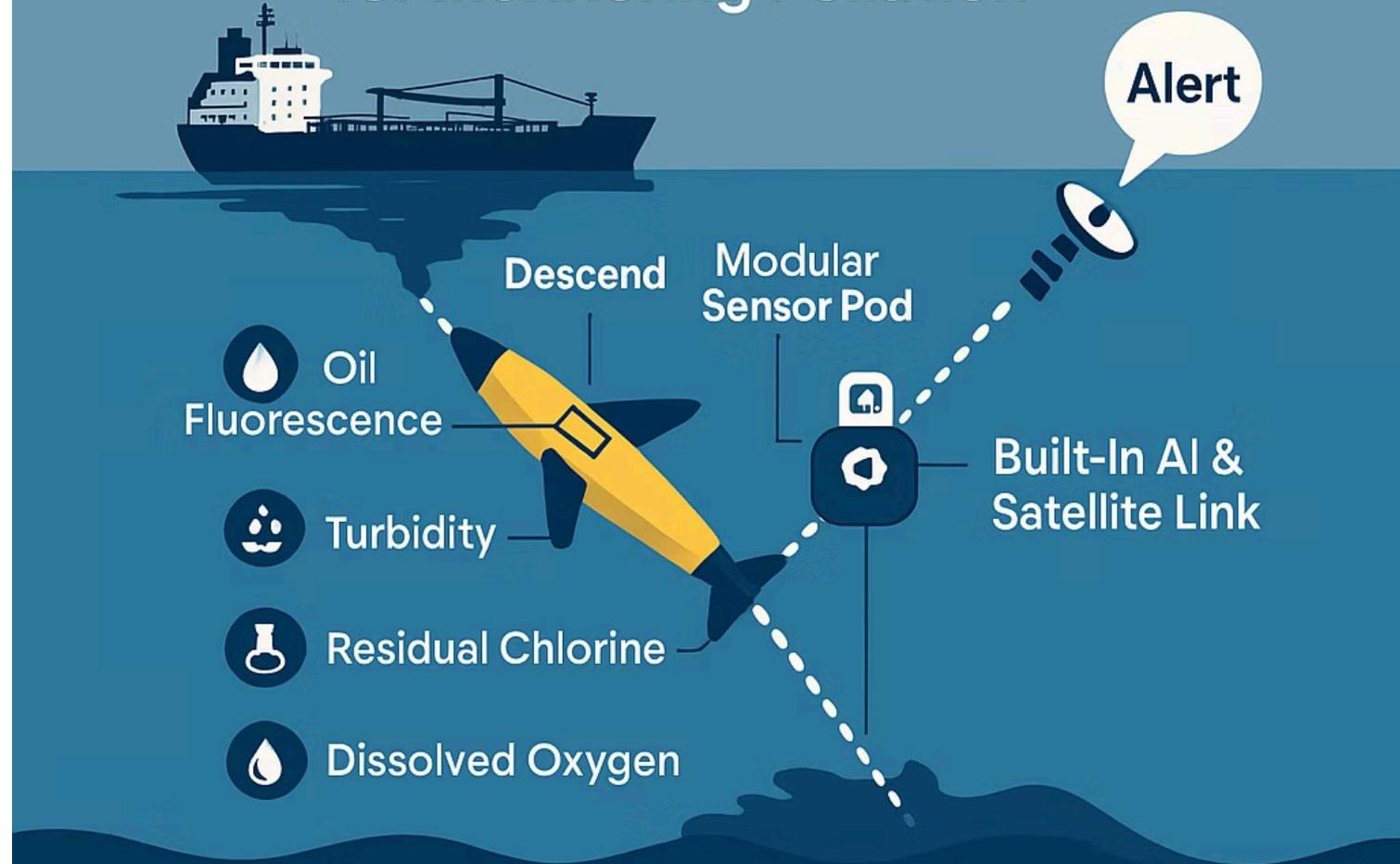
Sentinel

Every year, millions of gallons of oil, sewage, and other waste are illegally dumped into our oceans - often out of sight and under cover of darkness. Project Sentinel aims to solve this hidden crisis with autonomous underwater gliders that detect pollution in real-time.

[ELNAV.AI](https://www.elnav.ai)

Project Sentinel

AI-Enabled Underwater Glider for Monitoring Pollution



Monitoring of illegal ships' discharges



The Hidden Ocean Pollution Crisis

88M

Gallons of Oil

Illegally discharged from ships annually -
over 8 times the Exxon Valdez spill

44K

Oily Slicks

European satellites detected 44,000+
possible illegal spills over a recent 12-
year period

5+

Pollution Types

Including oily bilge water, raw sewage,
grey water, untreated ballast water, and
scrubber wash water

This pollution goes largely undetected, killing marine life and fouling beaches and fisheries. Most illegal dumping happens far from prying eyes - beyond the horizon, at night, or outside busy ports.



Why Current Enforcement Falls Short

Satellites & Patrol Aircraft

- Only spot large oil slicks in daylight
- Cannot detect subsurface pollution
- Sporadic and expensive
- Often pass over spills hours or days later

Coast Guard Inspections

- Rely on boarding when ships dock
- Damage already done at sea
- Need whistleblowers or falsified logs
- Many dumpers never get caught

In short, we lack a **continuous presence on the water** to detect pollution as it happens. Coastal scientists describe it as a "data desert" – we have almost no real-time water quality monitoring in busy shipping lanes.

Our Solution: Underwater "Speed Cameras" for the Ocean



Autonomous Underwater Gliders

A network of robot sentries equipped with smart pollution sensors and AI, patrolling 24/7 to catch illegal discharges in the act.

Real-Time Detection

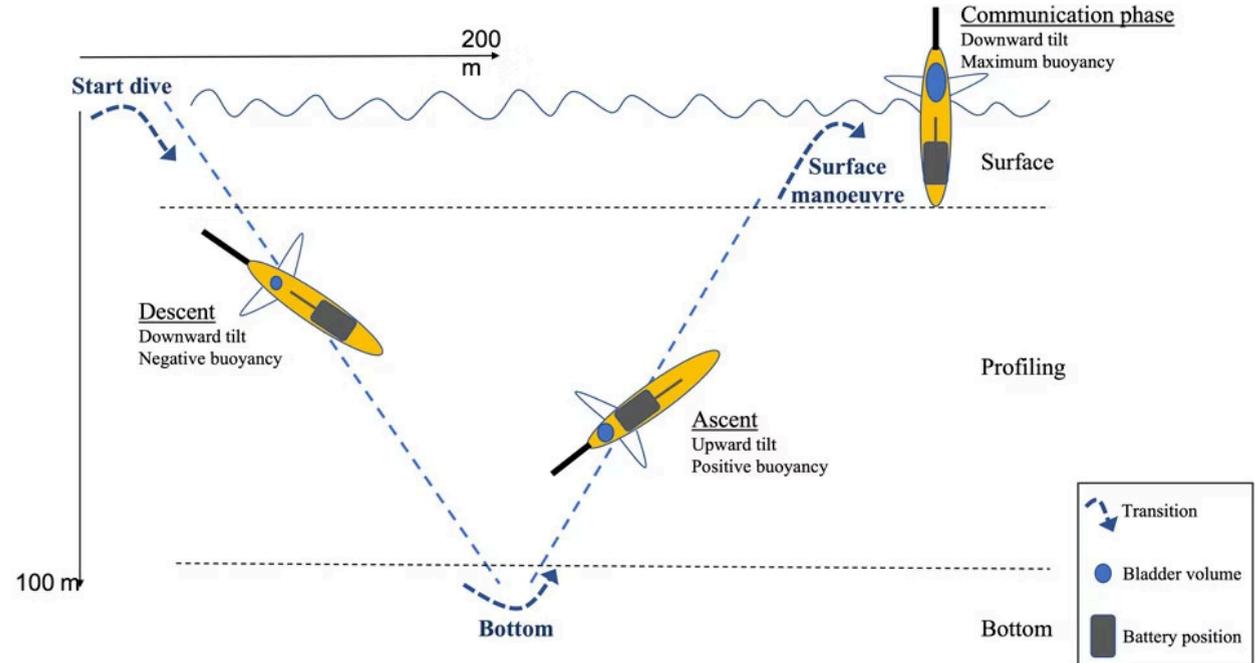
When pollution is detected, gliders immediately surface and transmit alerts with location data via satellite to enforcement agencies.

Deterrence Effect

Creates uncertainty for polluters - they'll know Sentinels might be nearby, even if they can't see them, making illegal dumping too risky to attempt.

How It Works

- Torpedo-shaped, buoyancy-driven robot that glides silently through water
- Cruises for months on battery power, even through rough seas
- Travels at 1-2 knots, lurking unseen beneath passing ships
- Programmed to patrol busy shipping lanes at depths of 30-100 meters
- On-board AI analyzes water in the ship's wake for pollution signatures



When the glider detects suspicious pollution, it surfaces nearby and immediately sends an alert with time, GPS coordinates, and sensor readings to authorities.

Comprehensive Pollution Detection Suite



Oil & Bilge Water

Miniature fluorometer detects hydrocarbons by their fluorescence. Even thin sheens or micro-slicks trigger this sensor, catching illegal bilge dumps that satellites would miss.



Sewage & Grey Water

Turbidity sensors detect cloudiness in water, while dissolved oxygen optodes measure falling oxygen levels - together creating a fingerprint for sewage/grey water events.



Ballast & Scrubber Water

Residual chlorine sensors detect untreated ballast water, while pH sensors and PAH fluorometers identify illegal scrubber effluent with excessive acidity or toxins.

All sensors are off-the-shelf components adapted from oceanographic equipment, integrated in a novel way with AI that filters out false positives and focuses on human pollution signals.

Pollution Monitoring as a Service

What you get

- 24/7 coastal coverage with Teledyne/ALSEAMAR gliders + ELNAV.AI multi-pollutant AI.
- End-to-end ops: mission planning, permits, launch & recovery, maintenance.
- Instant alerts and **evidence packets** (timestamps, geolocation, cryptographic sealing).
- Cloud dashboard & API; exports for SMART, Skylight.

Packages

- **Sentinel-10** — continuous cover for a **10 km** priority segment.
- **Sentinel-60** — regional bundle (~**60 km**) with multi-glider rotation.
- **Add-ons:** outfall sweeps, surge response, lab validation, satellite cueing.

Service Levels

- **Mission uptime:** $\geq 95\%$ per active glider (SLA-backed)
- **Detection → alert:** ≤ 10 min to dashboard/API
- **Evidence packet:** < 24 h with hash, timestamp, GPS & chain-of-custody
- **Maintenance:** ~ 4 vessel days/year/unit; scheduled with ≥ 7 -day notice
- **Support:** 24/7 monitoring · < 1 h triage · < 24 h swap/replace
- **Reports & data:** Monthly enforcement dossier; SMART/Skylight exports

Why it wins

- **No customer CAPEX** — subscription covers hardware & ops (we own/lease the fleet)
- Replaces costly patrol hours with always-on sensing.
- Converts detections into enforceable actions, not just dots on a map.

Sentinel makes “pollute and hide” impossible by delivering real-time, court-ready evidence of illegal discharges with SaaS-type economics.

Who Buys & Market Size

1

Regulators & Coast Guards

Court-ready evidence for enforcement ≈68 public buyers

- 22 EU coastal states
- 33 US gov buyers (30 coastal states + USCG/NOAA/EPA)
- 13 non-EU Med states

2

Port Authorities & Coastal States

Pre-arrival compliance & clean-harbor KPIs ≈170 priority ports

- 104 EU TEN-T core ports
- ~66 US major ports

3

Environmental NGOs & Foundations

Verified data for campaigns & litigation.

- 20–40 near-term funders
- Top 10–20 can fund national pilots

Assumptions:

- **Unit of sale:** *Sentinel-10* = 10-km continuous coverage segment. Price: ~€220k per segment-year.
- **Priority buyers:** coastal authorities & major ports (enforcement or water-quality mandates).
- **Avg. segments per buyer:** agencies 6–20, ports 2–6 → blended ~10.

TAM (global, core use-case):

~200 buyers × ~10 segments × €220k ≈ €440M/year. (Does not include data resale—core enforcement only.)

SAM (initial regions):

~90 buyers (EU + Med + U.S.) × ~6 segments × €220k ≈ €119M/year.

SOM (24-month target):

~30 early adopters × 2 segments × €220k ≈ €13.2M ARR.



Global Vision

Initial Pilot

- Central Adriatic traffic separation zones or Southern California shipping lanes
- One Teledyne G3 or ALSEAMAR C2 glider with full sensor suite
- 3-6 month trial in collaboration with research institution or Coast Guard
- **Success** = detecting pollution events that lead to **enforcement action**.

Global Expansion

- Geographically flexible - gliders can be shipped and deployed anywhere
- Scalable cloud-based data platform can ingest streams from dozens of gliders
- One operator can manage an entire fleet
- Potential for global ocean pollution monitoring system

Why Now: Timing and Impact



Regulatory Pressure

Record fines for polluters (e.g., \$40M for a cruise line) and new regulations on emissions. Enforcement officers know more dumping is happening than they can catch.



Autonomous Tech Advances

Underwater gliders now proven reliable (crossing entire ocean basins), sensor miniaturization, and real-time satellite communications make this solution possible today.



Founder Expertise

Team combines maritime industry knowledge and AI expertise, with firsthand experience of environmental damage and enforcement gaps.

The world is ready for Project Sentinel. The need is urgent, and the technology has matured at just the right time for intervention.

World-Class Team & Advisors

1

Hrvoje Mihovilović – CEO / Master Mariner

30+ years of sea service. Logged thousands of bridge hours, witnessed illegal bilge and sewage dumping first-hand, ran MARPOL drills, and knows the enforcement paperwork that coast-guard buyers work with every day.



2

Ivan Biliškov, PhD – CTO

Computer Science graduate with a focus on AI. Scaled CultureConnect to 300+ museum clients and sold the company; now transforms raw glider telemetry into a secure, multi-tenant platform regulators can rely on.



3

Prof. Paolo Gallina – Scientific Advisor

Head of Department, DIA – University of Trieste. Robotics and mechatronics expert with work in vision-based control and human-robot interaction; advises on edge-AI and sensor-fusion for autonomous gliders.



Competition & Moats

How we compare

Capability	Satellites	Patrol aircraft / vessels	Fixed buoys	USVs/AUVs	Sentinel gliders
Continuous presence	✘ (passes overhead)	✘ (sporadic, costly)	△ (point coverage)	△ (visible / endurance limits)	✓ months-long covert patrol
Subsurface detection	✘ (surface oil only)	△ (spot checks)	△	△	✓ multi-pollutant suite
All-weather / night	△	△	✓	△	✓
Cost per lane	✓ (cueing)	✘ (high)	△	△	✓ ~€220k/segment-year
Court-ready evidence	✘	△	△	△	✓ alerts + chain-of-custody

Our moats (why we win)

Evidence stack

Cryptographic sealing, timestamps/GPS, and chain-of-custody dossiers—turn detections into enforceable actions.

Multi-pollutant AI

Fused signals (oil fluorescence, turbidity/DO, residual chlorine, pH/PAH) to reduce false positives.

Ops & access

ALSEAMAR/Teledyne (hardware, L&R) + IOR lab validation + OCEANOGAMI legal/GDPR advisory.

Unit-economics clarity

Service pricing and SLA defined; buy-first with optional lease for surge—scales without customer CAPEX.

Team fit

Master Mariner + AI platform leadership tied to real enforcement gaps.

Traction — Partnerships

All letters/quotes available on request.

Industry

- **ALSEAMAR** — *LoS + quotation* · SeaExplorer gliders; launch & recovery; ops support
- **Teledyne Marine** — Supplier relationship · Glider platforms; integration & data interface



Research & Validation

- **DIA - Univ. of Trieste** — *LoI* · Edge-AI, sensor fusion, methods validation
- **Institute of Oceanography & Fisheries (Split)** — *LoS* · Vessel days; lab validation



**UNIVERSITÀ
DEGLI STUDI
DI TRIESTE**



Legal & Policy

- **OCEANOGAMI** — Advisory · GDPR evidence chains & cryptographic sealing; SMART/Skylight/GFW integration; MARPOL & scrubber washwater; in-situ admissibility; EU alignment



Investment Opportunity

We're raising **€2.5M seed** to deploy a **buy-first** model, prove paid pilots, and set up scale financing.

Default: own the core fleet. **Option:** lease extra units only with customer prepayment.

Seed-Funded Core Fleet

Two owned gliders to establish operations and serve anchor customers

Flexible Rental Capacity

Four leased units for 12-month pilots (pre-paid; ≤ 1 -month deposit).

Strategic Conversion

Convert long-term contracts to owned/financed units to increase margins by €20-60K per unit

Use of Funds & Runway

- 2 owned gliders (@€400k): €0.80M
 - Spares & launch/recovery gear: €0.20M
 - Ops (year-1, 2 units): ~€0.14M
 - Team (eng, ops, BD): €0.65M
 - Cloud/data/insurance/legal: €0.18M
 - Working capital & field travel: €0.48M
 - Contingency: €0.05M
- Total: €2.50M → 18-24 months runway

Seed-Round Milestones

- 2 paid pilots live with owned units (SLA uptime, court-ready evidence).
 - ARR run-rate: ~€0.45-€0.65M (owned units only).
 - Equipment-finance line signed to scale post-seed.
 - Evidence Stack v1 shipped (alerts, chain-of-custody, API).
- Optional:** Lease 4 units only against pre-paid 12-month pilots (≤ 1 -month deposit).

Unit Economics (baseline, owned)

- **Unit Economics (baseline, owned):** Price €220k per active glider-year · Direct ops ~€72k · Depreciation ~€72k (5-yr life, 10% residual) → ~€76k EBIT (~35%).
- **Assumptions:** 12-month contracts, 85% contracted utilization, ~4 vessel days/yr. Leases used only with pre-paid pilots (≤ 1 -month deposit); customers pay quarterly in advance.

Environmental and Economic Impact

Environmental Benefits

- Significantly reduced chronic ocean pollution
- Healthier marine ecosystems and fisheries
- Cleaner beaches and coastal waters
- Protected marine life and biodiversity

Economic Value

- Cost-effective enforcement (vs. patrol vessels)
- Improved tourism in coastal regions
- Healthier fishing industry
- Pioneering new maritime security technology

The first time our system alerts and authorities intercept a vessel or levy a fine based on our data, it will send shockwaves through the maritime community that the seas are no longer lawless for polluters.



It's Like Giving the Ocean Its Very Own Guardian

One that never sleeps, never gets seasick, and always keeps watch

By this time next year, we aim to have the world's first AI-enabled pollution-monitoring glider patrolling waters, proving that we can safeguard our oceans in a way that's never been done before.

Hrvoje Mihovilović / CEO

Email: hrm@elnav.ai

Tel: +385 91 443 3348

Digital Dalmatia Tech Hub

Ruđera Boškovića 25

21000 Split, Croatia

© 2025 ELNAV.AI d.o.o.

elnav.ai/sentinel

