

PILOT BRIEFING

Every violation caught. Every offender identified.

Automated enforcement for national parks, marine reserves, and heritage sites. From boundary crossing to logged consequence, with no bystander required.

Certainty of being caught changes behavior. Severity of punishment does not.

The problem

Tourism volume at ecologically and culturally sensitive sites has outpaced the capacity of rangers, site staff, and local authorities to monitor and enforce conduct rules. Three gaps persist:

Coverage gap. Most violations occur away from any staff member, in places impossible to watch continuously with personnel alone.

Enforcement gap. Even where rules exist, there is usually no way to identify an offender after the fact, so penalties go unenforced.

Attribution gap. Sensors and footage can show that something happened. They cannot reliably say who did it without a next step.

Result: reef damage, wildlife harassment, trail litter, and heritage-site destruction continue wherever tourism outpaces enforcement capacity.

The system

Four detection layers, from satellite to human sign-off. Automated detection does the heavy lifting. Human review is reserved for the cases the law requires.

LAYER	TOOL	AUTOMATION
Site-level	Tasked satellite imagery	Fully automated
Zone-level	Cameras, drones, ANPR, geofenced tags	Largely automated
Remote zones	Satellite-uplink GPS tag	Automated, periodic
Individual-level	Ranger evidence + tag scan	Human-confirmed

How it works

Seven steps from entry to consequence. No bystander required.

STEP	ACTION	WHAT HAPPENS
1. Register	Visitor checks in at	Permit tag issued, identity linked, zone access set

	entrance	
2. Detect	Violation occurs	Zone camera flags the act, geofence tag confirms who was there
3. Alert	System dispatches	Coordinates, camera frame, and tag proximity sent to the nearest ranger
4. Scan	Ranger arrives	NFC tag scan resolves tag to permit to identity on file
5. Log	Evidence assembled	Camera, geofence, tag, scan, ranger ID. Timestamped, immutable
6. Enforce	Consequence applied	Rule engine classifies tier, officer confirms, fine issued
7. Record	Record propagated	Violation on file across the network. The system remembers.

Consequence ladder

The tier is set by the violation, not the officer. No discretion, no negotiation.

TIER	VIOLATION	CONSEQUENCE	REVIEW
Tier 1 · Minor	Littering, off-trail	On-site fine, warning logged	Fully automatic
Tier 2 · Moderate	Wildlife harassment, off-track driving	Higher fine, permit revoked	One-tap confirm
Tier 3 · Severe	Heritage damage, injury to wildlife	Fine, entry ban, formal record	Full human review

Legal basis

Every component has a legal anchor. Nothing here is a novel legal theory.

ANPR / license plates. The same technology already running speed cameras and toll roads worldwide. Decades of precedent.

Human review at Tier 3. GDPR Article 22 and equivalents require human confirmation before a decision with serious legal effect. A legal floor, not a design preference.

Future entry screening. Built on sovereign immigration discretion, not administrative penalty. A state's broad, established authority over who it admits.

Site-specific permits. The same model as trekking permits and timed-entry ticketing at Machu Picchu and the Acropolis. Not a new imposition.

Pilot investment

Phase 1 is a single-site deployment. 6 to 12 months. The goal is not coverage. The goal is proving the detection-to-consequence loop works end to end, collecting false-positive data, and establishing the evidentiary baseline for expansion.

H A R D W A R E

COMPONENT	QUANTITY	TOTAL COST
Fixed zone cameras (ruggedized, IP67)	10 to 20	\$30,000 to \$100,000
NFC tag readers (entrance + zone boundaries)	4 to 8	\$8,000 to \$32,000
NFC permit tags (per-visitor consumable, year 1)	50,000 units	\$100,000 to \$250,000
Ranger handset devices (ruggedized, NFC-enabled)	10 to 15	\$8,000 to \$18,000
Network infrastructure (on-site relay)	1 system	\$15,000 to \$30,000
Cloud hosting (pilot phase, no field servers)	12 months	\$60,000 to \$120,000

Hardware subtotal (year 1)**\$221,000 to \$550,000****S O F T W A R E**

COMPONENT	COST
Ranger mobile app (NFC scan, violation reporting, offline sync)	\$80,000 to \$150,000
Rule engine (tier classification, consequence automation)	\$60,000 to \$120,000
Evidence management (immutable record store, appeal workflow)	\$50,000 to \$100,000
Admin dashboard (case review, audit trail)	\$40,000 to \$80,000
Camera integration and zone monitoring pipeline	\$30,000 to \$60,000
NFC tag provisioning and identity linking	\$20,000 to \$40,000
Integration, testing, and deployment	\$40,000 to \$80,000

Software subtotal**\$320,000 to \$630,000****A N N U A L O P E R A T I O N S**

ITEM	COST
Project manager	\$120,000 to \$160,000
Field technician / hardware maintenance	\$60,000 to \$80,000
Ranger training	\$15,000 to \$30,000
Cloud hosting and data storage	\$60,000 to \$120,000
Tag replenishment (ongoing)	\$50,000 to \$125,000
Insurance and compliance	\$20,000 to \$40,000

Operations subtotal (annual)**\$325,000 to \$555,000**

PHASE 1 ALL-IN (YEAR 1)**\$866,000 to \$1,735,000**

Return on investment

Phase 1 costs less than a single year of the enforcement gap it closes.

Park revenue context. One national park system generates roughly \$50M annually in entry fees, of which approximately 5% reaches direct conservation activity. A sub-\$2M pilot that demonstrates measurable enforcement improvement is a rounding error against that revenue.

Fine revenue offset. At a site processing 50,000 tagged visitors per year with a conservative 1% violation rate and an average Tier 1 fine of \$150, the system generates \$75,000 in fine revenue annually. This does not justify the investment on its own, but it offsets operational costs and establishes a self-sustaining funding mechanism for Phase 2.

Deterrence value. The primary ROI is behavioral. If certainty of detection reduces violation rates by even 20%, the avoided cost of environmental remediation, wildlife rehabilitation, and heritage restoration dwarfs the system cost. A single coral reef restoration project costs \$1M to \$5M per hectare.

The team required

The ecps platform does not exist as a commercial product. It must be built. The Phase 1 team is small and senior. No juniors: every hire must ship production code from day one.

ROLE	COUNT	RESPONSIBILITIES
Technical Lead / Architect	1	System architecture, API design, security model, infrastructure
Backend Engineers (Senior)	2	Rule engine, evidence store, tag provisioning, camera pipeline, API layer
Mobile Engineer (Senior)	1	Ranger app: NFC scanning, violation reporting, offline-first sync
Frontend Engineer (Senior)	1	Admin dashboard, case review, appeals workflow, audit trail
DevOps / Infrastructure	1	Cloud infrastructure, CI/CD, monitoring, security hardening
Product Manager	1	Requirements, stakeholder communication, pilot coordination
Designer (Product / UX)	1	Ranger app UX, dashboard design, field-tested interaction patterns

Phase 1 team (8 people, annual)**\$1,410,000 to \$1,880,000**

Duration: 6 to 9 months to MVP. The team builds the platform, deploys at the pilot site, and operates through the initial data-collection period. Phase 2 expansion adds 7 roles (ML engineer, data engineer, security engineer, QA, additional backend and mobile engineers) for a 15-person team.

The pilot

A single site. 6 to 12 months. Real data before we scale.

PARAMETER	SPECIFICATION
Scope	One national park entrance station, one monitored zone
Reporting	Rangers and licensed guides only
Technology	NFC tag-scan + zone cameras + rule-based tiering
Consequences	Tiers 1 and 2 only, logged appeal from day one
Ownership	Platform built and operated by ecps. Deployed in partnership with the destination authority.
Timeline	6 to 12 months
Estimated cost	Under \$2M all-in (hardware, software, team, operations)

What we deliver

ecps is a platform company. We build the detection and enforcement software, specify the hardware, and deploy the system at your site. You provide the site, the regulatory authority, and the rangers. The platform remains ours. The enforcement authority remains yours.

Software. Custom-built enforcement platform: ranger app, rule engine, evidence store, command dashboard.

Hardware. Procurement specification for commercial off-the-shelf cameras, tag readers, and network infrastructure.

Deployment. On-site installation, integration, and 6 to 12 months of supported operation.

Data. Detection accuracy reports, false-positive analysis, enforcement metrics, go/no-go recommendation for Phase 2.

Ownership. You own the enforcement authority and the operational data. We own the platform and the IP.

DETAILED TECHNICAL AND COST SPECIFICATIONS AVAILABLE ON REQUEST
CONTACT: ECPS.VERCEL.APP