# Reducing Illegal Fishing Using Behavior Change Interventions

## A case study in the Upper Gulf of California

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# THE PROBLEM OF ILLEGAL FISHING

- Illegal fishing: **intentional disregard of fishing regulations**
- Threat to fisheries sustainability
  - Adds to over-harvesting, pollution, and other anthropogenic impacts
- Fisheries management objective: "ensure the continued productivity of the resources and the accomplishment of other fisheries objectives" (FAO, 2002).

> "Reducing fish stocks to biologically and ecologically harmful levels will result in a loss of potential benefits as food, income, employment and others, both immediately and in the long term" (FAO, 1997)

- Evidence suggests prevalence varies greatly across geographies
  - High-governance vs. **Low-governance contexts**

- **Top–down, command and control** regulations
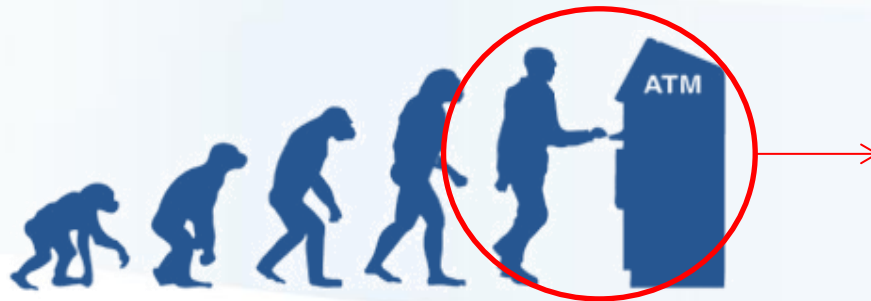- "**Deterrence Theory**" (Becker, 1968)

$$EU_j = p_j U_j(Y_j - f_j) + (1 - p_j) U_j(Y_j)$$

where:
- $Y_j$: income from offense (monetary and psychic)
- $U_j$: utility function
- $p_j$: probability of apprehension and conviction
- $f_j$: monetary equivalent of the punishment if convicted



Credit: rps205.com



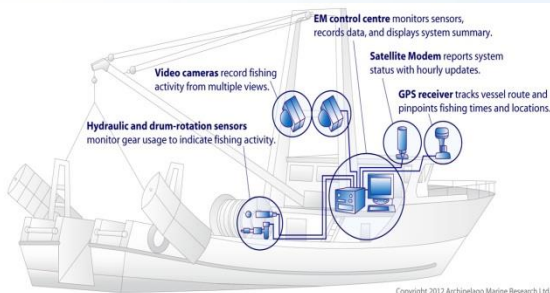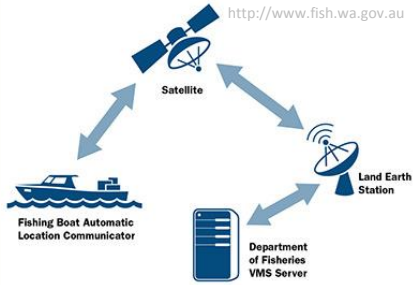Credit: http://karenbernsteinlaw.com/trademark-monitoring-enforcement-program
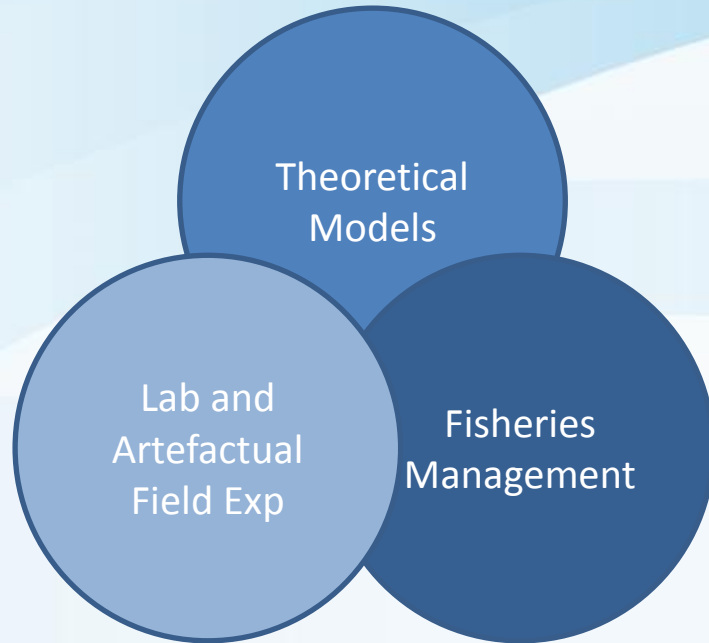


~~*Homo-Economicus:*~~

- **PROSPECT THEORY**
- **SOCIAL DIMENSION**
- **BOUNDED RATIONALITY**

Illegal fishing is a complex issue where an array of economic, institutional and social factors interacts to determine its form and level of occurrence (Le Gallic and Cox, 2005)



Low level of fines and penalties

Limited Gov funding and capacity

Organized crime

Illegal fishing

Poverty and limited Eco Altern

High cost of optimal enforcement

Corruption

# USING BEHAVIORAL INTERVENTIONS TO ADDRESS THE DRIVERS OF ILLEGAL FISHING

# 8 STEP PROCESS FOR DESIGNING AND IMPLEMENTING BEHAVIORAL INTERVENTIONS TO REDUCE ILLEGAL FISHING

1. Gain an **in-depth understanding** of the community
2. Identify different **types of high impact illegal fishing**, and **relevant stakeholders** directly and indirectly associated with each type of behavior.
3. Identify the social, cognitive, psychological, and contextual **factors driving each type of actor**
4. **Design hypothetical interventions** to disrupt these drivers
5. **Experimentally test** those hypotheses
6. **Pilot interventions**
7. **Scale-up** tested interventions
8. Implement **monitoring and evaluation systems**

# THE GULF CURVINA FISHERY IN *GOLFO DE SANTA CLARA* IN THE UPPER GULF OF CALIFORNIA
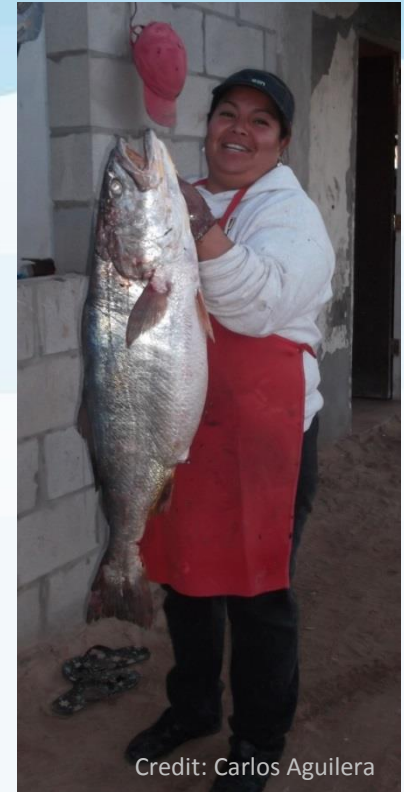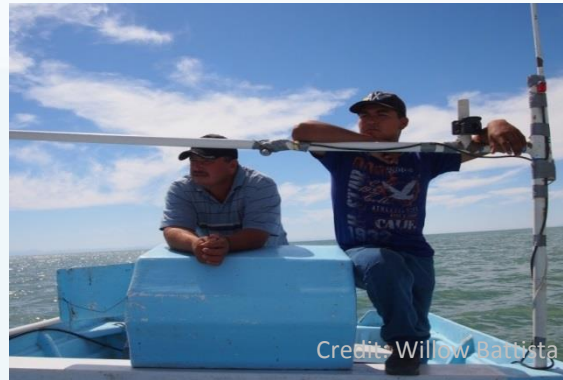
# 1. THE GULF CURVINA FISHERY

**The Gulf Curvina** (*Cynoscion othonopterus*) fishery is one of the most important I the region due to its catch volumes and social impact.

- **2007** Fishery's management plan
- **2011** TAC published for the first time
- **2012** Curvina specific permits are issued
- **2013** IVQ is established




Credit: Carlos Aguilera


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| Community | No. of permits | % of permits | No. of fishermen |
|---|---|---|---|
| Golfo de Santa Clara, Sonora | 435 | 60% | 1,305 |
| Cucapá | 109 | 15% | 327 |
| Bajo Río, Baja California | 48 | 7% | 144 |
| San Felipe, Baja California | 129 | 18% | 387 |
| | **721** | **100%** | **2,612** |

# 2. IDENTIFY TYPES OF ILLEGAL FISHING AND RELEVANT STAKEHOLDERS


Credit: Carlos Aguilera


Credit: Willow Battista


Credit: Carlos Aguilera


Credit: Willow Battista


Credit: Willow Battista

# 3. Understanding illegal fishing behaviors and drivers



Credit: Elvia Marín



Credit: Elvia Marín



Credit: Elvia Marín



Credit: Elvia Marín

# 4. DESIGNING INTERVENTIONS



The Pope

Social disapproval

Venting

Sustainable fishing group

# 5. TEST EXPERIMENTS

- Decisions on how many fish to catch
- Baseline / Treatment



| Fish extracted by the other four members of my group | My extraction level | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 4 | 49 | 55 | 59 | 64 | 69 | 73 |
| 5 | 48 | 53 | 58 | 63 | 67 | 71 |
| 6 | 47 | 52 | 57 | 61 | 65 | 69 |
| 7 | 46 | 51 | 56 | 60 | 64 | 67 |
| 8 | 45 | 50 | 54 | 58 | 62 | 66 |
| 9 | 44 | 49 | 53 | 57 | 61 | 64 |
| … | …. | …. | …. | …. | …. | …. |
| …. | …. | …. | …. | …. | …. | …. |

# 5.1. RUNNING EXPERIMENTS

- Direct measurement of behavior change in actual stakeholders in actual context

- Different combinations of interventions

- Surveys at the end of game

# Next Steps

6.  **Pilot Intervention**

7.  **Scale-up** tested intervention

8. Implement **monitoring and evaluation systems**



Credit: Carlos Aguilera



Credit: Willow Battista

# TO RECAP…

- Illegal fishing is a pervasive threat to fisheries around the world
- Corruption, lenient penalties, and other problems constrain the efficacy of enforcement systems.
- **Beyond monetary incentives behavioral factors are be driving illegal fishing activities**
- Effective interventions to deter and/or change illegal behaviors can be developed and implemented guided by the **systematic process** proposed in this presentation
- **Behavioral interventions may be particularly useful in low-governance fisheries that lack resources for high levels of surveillance and enforcement**

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