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| **Study** | **Components** | **Results** |
| *Lutjanus guttatus* population dynamics | Average snapper length (2007-2013) | Statistically significant increase |
| Mortality rates and exploitation ratio | Natural mortality (M)=0.43 Fishing mortality (F)=0.34, Total mortality (Z)=0.77 Exploitation ratio (E)=0.44 |
| Bottom-longline catch composition and selectivity | Snapper catch per unit of effort (CPUE) 2007-2013 | No significant change |
| Snapper size selectivity | 84.6% are at or above the species’ size at first maturity |
| Target species selectivity | 51.5% of all organisms captured |
| Bycatch | 48.5% of all organisms captured |
| Discards | Estimated 10-20% |
| FEK | Economic dependence on fishery | 71.4% of population have not developed alterative employment options |
| Present and future economic situation | 95.9% of population of fishers believe they have a declining economic situation and uncertain economic future. |
| Wellbeing | 92.0% of fishers believe they have a high quality of life |
| Quantity of snappers in the past/future | 93.9% of fishers believe there were more snappers in the past and there will be fewer in the future |
| Fishing distances have changed | 47.0% of fishers believe that the distances they travel to fish have changed |
| Longline damage to sea bed | 95.9% of population believe bottom-longlines do not harm the environment |
| Disappearance of species | 53.1% of the population believe that certain types of species commonly caught in the past are rarely seen today |
| Level of fisher organization | Population dispersed between three associations that include 55.1% of fishers. Remaining fishers work independently |
| Presence of illegal fishing (national industrial fleet) | 93.9% of fishers feel there is insufficient government control over illegal fishing |
| Management plan | No local management strategy exists |
| Catch monitoring and data collection | Entire population collaborates with researchers to collect catch data |
| Participatory governance | No recognized system exists in Costa Rica |
| MPA development | Two MPAs exists in the area. 100% of focus group participants agree that illegal fishing occurs in these areas |

Table 1. Results of *Lutjanus guttatus* population dynamics, bottom-longline catch composition and selectivity, and FEK studies with artisanal bottom-longline fishers in Bejuco, Pacific coast, Costa Rica (Bystrom, 2015).

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| SUB-SYSTEM | CATEGORY | INDICATOR | COLOR CODING FOR PRESENT STUDY | REFERENCE FOR COMPARED STUDY | FISHERY, TARGET SPECIES, LOCATION, OR RESEARCH TOPIC | COLOR  CODING FOR COMPARED STUDY |
| **Natural** | ***Lutjanus guttatus* population dynamics** | **Total lengths 2007-2013** |  | Stobart et al., 2009 | Trammel net, *Palinurus elephas* , Mediterranean coast, Spain |  |
| Ault, Smith, & Bohnsack,2005 | Snapper-grouper complex  Florida Keys |  |
| Shin, Rochet, Jennings, Field, & Gislason, 2005 | Size-based indicators to evaluate fishing impacts |  |
| **Mortality** |  | Cushing, 1968 | Mortality and suitable exploitation ratios (E) |  |
| Gulland, 1971 | Mortality and suitable exploitation ratios (E) |  |
| Amezcua, Soto-Avila, & Green-Ruiz, 2006 | Shrimp trawl,  *L. guttatus* Gulf of California, Mexico, age, growth, and mortality |  |
| Vargas, 1998-99 | Gillnet and bottom-longline, *L. guttatus,* Gulf of Nicoya, Costa Rica |  |
| **Bottom-longline catch composition and selectivity** | **Snapper catch per unit of effort (CPUE) 2007-2013** |  | Walters, 2003 | Analysis of spatial catch per effort data |  |
| Maunder et al., 2006 | Interpreting CPUE for stock assessment |  |
| **Snapper size selectivity** |  | Mongeon, Granek & Arauz , 2013 | Bottom-longline,  *L. guttatus* Bejuco, Costa Rica |  |
| Correa-Herrera & Jiménez-Segura, 2013 | Artisanal hand-line, *L. guttatus*, Utría National Park, Colombia |  |
| **Target species selectivity** |  | Erzini, Gonçalves, Bentes, Lino, & Ribeiro, 1999 | Experimental longlines, *Merluccius merluccius, Conger conger, Polyprion americanus*, Algarve, Portugal |  |
| Revolusi, Wibowo, & Sahari, 1999 | Bottom-longline,  *Lutjanus* spp., Indonesia |  |
| Beltrano et al., 2004 | Bottom-longline and gillnet, Scorpaenidae, Sepiidae, Octopodidae, Sparidae, Serranidae, Mullidae, Labridae, Egadi Islands, Italy |  |
| Mamauag, Aliño, Gonzales, & Deocadez, 2009 | Artisanal longline, *Epinephelus coioides*, Philippines |  |
| **Bycatch** |  | Lutchman, 2014 | Use of bycatch % to develop a scoring system |  |
| **Discards** |  | Alverson et al., 1994 | Global bycatch and discard ratios (FAO) |  |
| Kelleher, 2005 | Central American artisanal fishery discard rates |  |
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| **Human** | **Socio-ecological tendencies (as defined by FEK)** | **Economic dependence on fishery** |  | Daw et al., 2012 | Western Indian Ocean, artisanal fisher adaptive responses and alternative livelihoods |  |
| Emmerson, 1980 | Philippines, Indonesia, Sri Lanka, horizontal fishery integration: opportunities for nonfishing employment |  |
| **Present and future economic situation** |  | FAO, 2014 | Costa Rica, socio-economic pressures facing artisanal fisheries |  |
| **Wellbeing** |  | Pollnac, Pomeroy, & Harkes, 2002 | Southeast Asia, fisher job satisfaction |  |
| González, 2011 | Atlantic coast, Nicaragua, artisanal fishign community wellbeing |  |
| **Quantity of snappers in the past/future** |  | Blyth, 2013 | Mozambique, Africa, social and ecological changes in coastal systems |  |
| Ward et al., 2004 | Overcapacity in artisanal fisheries  FAO |  |
| Golden et al., 2014 | Lutjanidae and others, Fiji, FEK to evaluate heavily targeted species in artisanal fisheries |  |
| **Fishing distances have changed** |  | Van Holt, 2012 | Dive fishery, Chile loco, *Concholepas concholepas*, Chile, Traditional ecological knowledge |  |
| **Longline damage to seabed** |  | Sharp, Parker & Smith, 2009 | Bottom-longline, *Dissostichus mawsoni*, New Zealand benthic impact assessment, |  |
| **Disappearance of species** |  | FAO, 1984 | A review of papers on the regulation of fishing effort |  |
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| **Management** | **Governance, research, planning** | **Level of fisher organization** |  | Frangoudes, Marugán-Pintos, & Pascual-Fernández, 2008 | Improving fisher community organization and social dimensions strategies |  |
| **Presence of illegal fishing (national industrial fleet)** |  | Sumaila Alder, & H. Keith ,2006 | Analysis of costs, benefits, and risks of IUU fishing, global context |  |
| **Management plan** |  | Jentoft, 1989 | Co-management strategies for SSFs |  |
| **Catch monitoring and data collection** |  | Frangoudes et al., 2008 | Shellfish, Galicia, Spain, avoiding overexploitation through data collection |  |
| **Participatory governance** |  | Quesada-Alpízar, 2006 | Costa Rica, encouragement for and limitations to participatory management in |  |
| Mahon et al., 2008 | Enabling self-organization, learning and adaptation for the management of complex human-in-nature systems |  |
| Kearney et al., 2007 | Canada, participatory governance for ecological sustainability and economic development |  |
| **MPA development** |  | Halpern, 2003 | Density, biomass, size of organisms, and diversity inside marine reserves  Global context |  |
| Alvarado et al., 2012 | Costa Rica, coverage and threats to Costa Rican MPAs |  |

Table 2. Results of the traffic light approach that assigned colors to indicators based on their trends in the Bejuco bottom-longline snapper fishery, Pacific coast, Costa Rica. Green lights were assigned to indicators demonstrating improving or increasing trends, red lights denote declining or deteriorating indicator trends, and yellow lights indicate no change or an absence of sufficient information.