**Drivers of retention and discards of elasmobranch non-target catch**

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**SUPPLEMENTARY MATERIALS**

**Table S1** List of references used for conversion from mass to individuals. Conversion was reference-specific wherever possible. W, RW, and EW represent weight, round weight, and eviscerated weight respectively. TL and FL represent total length and fork length respectively.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Taxonomic****Groups** | **Species** | **Method** | **Average****weight (kg)** | **Reference** |
| Catsharks | *Galeus melastomus* | W=0.0015TL^3.190 | 0.0432 | Carbonell *et al*.2003 |
|   |  |  |  | Connolley 1996 |
|   |  |  |  | Mendes *et al.* 2004 |
|   | *Holohalaelurus regani* | 1.760 inds per kg | 0.568 | Walmsley 2007 |
|   | *Scyliorhinus capensis* | 0.807 inds per kg | 1.239 | Walmsley 2007 |
|   | *Scyliorhinus canicula* | W=0.0008TL^3.375 | 0.2042 | Carbonell *et al.* 2003 |
| Deep-sea | *Centrophorus squamosus* | W=0.05TL^2.52 | 10.6 | Connolley 1996 |
| Squaloids | *Centroscyllium fabricii* | avg length at weight | 1.1625 | Ulleweit 2010 |
|   |  |  |  | Jakobsdottir 2001 |
|   | *Etmopterus princeps* | avg length at weight | 1.348 | Ulleweit 2010 |
|   |  |   |   | Jakobsdottir 2001 |
| *Isurus* | *Isurus oxyrinchus* | avg length at weight | 82 | Campana *et al*. 2004 |
|  | *Isurus oxyrinchus* | RW=0.00008FL^2.636 | 48.32 | Fowler 2009a |
|  |  |   |   | Campana *et al*. 2004 |
| *Prionace* | *Prionace glauca* | avg length at weight | 75 | Campana *et al*. 2005 |
|  | *Prionace glauca* | RW=0.0000032FL^3.128 | 27.11 | Fowler 2009 |
|  |  |   |   | Campana *et al*. 2005 |
| Skates | *Amblyraja radiata* | 1.64 inds per kg | 0.609 | Ulleweit 2010 |
|   | *Bathyraja trachura* | avg length at weight | 1 | Bonfil 1999 |
|   |  |  |  | unpublished data |
|   | *Beringraja binoculata* | avg length at weight | 8 | Bonfil 1999 |
|   |  |  |  | unpublished data |
|   | *Dipturus pullopunctatus* | avg length at weight | 1.549 | Walmsley 2007 |
|   |  |  |  | Walmsley-Hart 1999 |
|   | *Leucoraja wallacei* | avg length at weight | 1.132 | Walmsley 2007 |
|   |  |  |  | Walmsley-Hart 1999 |
|   | *Raja rhina* | avg length at weight | 5.6 | Bonfil 1999 |
|   |  |  |  | unpublished data |
|   | *Raja straeleni* | avg length at weight | 1.132 | Walmsley 2007 |
|   |  |  |  | Walmsley-Hart 1999 |
|   | Rajiformes | avg length at weight | 8 | Benson et al. 2001 |
|   |  |  |  | Bonfil 1999 |
|   |   |   |   | unpublished data |
| Smoothhounds | *Mustelus* spp. | ln(EW)=3.1\* ln(TL)-6.33 | 3 | Chiaramonte 1998 |
| *Squalus* | *Squalus megalops* | 1.970 inds per kg | 0.507 | Walmsley 2007 |
|  | *Squalus* spp. | 1.970 inds per kg | 0.507 | Walmsley 2007 |

**Table S2** Description of taxonomic groups.

|  |  |  |  |
| --- | --- | --- | --- |
| **Taxonomic** | **Genus** | **Common name** | **Number of species** |
| **Group** |  |  | **in dataset** |
| *Alopias* | *Alopias* | thresher sharks | 3 |
| *Carcharhinus* | *Carcharhinus* | requiem sharks | 8 |
| Catsharks | *Cephaloscyllium* | Australian Swellshark | 1 |
|   | *Galeus* | Blackmouth Catshark | 1 |
|   | *Holohalaelurus* | Izak Catshark | 1 |
|   | *Scyliorhinus* | catsharks | 2 |
| Deep-sea | *Centrophorus* | gulper sharks | 2 |
| Squaloids | *Centroscyllium* | Black Dogfish | 1 |
|   | *Centroscymnus* | velvet dogfish | 1 |
|   | *Deania* | gulper sharks | 2 |
|   | *Etmopterus* | lanternsharks | 3 |
|   | *Somniosus* | Pacific Sleeper Shark | 1 |
|   | *Zameus* | Velvet Dogfish | 1 |
| *Isurus* | *Isurus* | mako sharks | 2 |
| *Prionace* | *Prionace* | Blue Shark | 1 |
| Rays | *Myliobatis* | eagle rays | 2 |
|   | *Pteroplatytrygon* | Pelagic Stingray | 1 |
|   | *Trygonoptera* | stingarees | 2 |
|   | *Urolophus* | stingarees | 2 |
| Skates | *Amblyraja* | skates | 2 |
|   | *Atlantoraja* | skates | 3 |
|   | *Bathyraja* | skates | 2 |
|   | *Beringraja* | Big Skate | 1 |
|   | *Dipturus* | skates | 3 |
|   | *Leucoraja* | skates | 4 |
|   | *Psammobatis* | skates | 3 |
|   | *Raja* | skates | 9 |
|   | *Rajella* | Round Skate | 1 |
|   | *Sympterygia* | Smallnose Fanskate | 1 |
|   | *Zearaja* | skates | 2 |
| Smoothhounds | *Furgaleus* | Whiskery Shark | 1 |
|   | *Galeorhinus* | Tope Shark | 1 |
|   | *Mustelus* | smoothhound sharks | 2 |
| *Sphyrna* | *Sphyrna* | hammerhead sharks | 3 |
| *Squalus* | *Squalus* | spurdogs | 3 |
| **11** | **35** |  | **78** |

**Supplementary Material References**

Benson, A.J., McFarlane, G.A. & King, J.R. 2001. A Phase ‘0’ Review of Elasmobranch Biology, Fisheries, Assessment and Management. Fisheries and Oceans Science. Canadian Science Advisory Secretariat. Research Document 2001/129 70 pp.

Bonfil, R. (1999) The dogfish (Squalus acanthias) fishery of British Columbia, Canada and its management. Case studies of the management of elasmobranch fisheries. Part 2, Chapter 21, ed. R. Shotton.. FAO Fisheries Technical Paper 378(2).

Campana, S.E., Marks, L., & Joyce, W. 2004. Biology, fishery, and stock status of shortfin mako sharks (Isurus oxyrinchus) in Atlantic Canadian waters. Canadian Science Advisory Secretariat Research Document 2004/094 29 pp.

Campana, S.E., Marks, L., Joyce, W. & Kohler, N. 2005. Catch, by-catch and indices of population status of blue shark (Prionace glauca) in the Canadian Atlantic. International Commission for the Conservation of Atlantic Tunas 58(3): 891-934.

Carbonell, A., Alemany, F., Merella, P., Quetglas, A., & Roman, E. (2003) The by-catch of sharks in the western Mediterranean (Balearic Islands) trawl fishery. *Fisheries Research* **61**: 7-18

Chiaramonte, G.E. (1998) Shark fisheries in Argentina. *Marine and Freshwater Research* **49**: 601-609.

Connolly, P.L., & Kelly, C.L. (1996) Catch and discards from experimental trawl and longline fishing in the deep water of the Rockall Trough. *Journal of Fish Biology* **49**: 132-144.

Fowler, G.M., & Campana, S.E. (2009) Commercial by-catch of blue shark (Prionace glauca) from longline fisheries in the Canadian Atlantic. International Commission for the Conservation of Atlantic Tunas 64(5): 1650-1667.

Fowler, G.M., & Campana, S.E. (2009a). Commercial by-catch rates of shortfin mako (Isurus oxyrinchus) from longline fisheries in the Canadian Atlantic. International Commission for the Conservation of Atlantic Tunas 64(5): 1668-1676.

Jakobsdottir, K.B. (2001) Biological aspects of two deep-water squalid sharks: Centroscyllium fabricii and Etmopterus princeps in Icelandic waters. *Fisheries Research* **51**(2-3): 247-265.

Mendes, B., Fonseca, P. & Campos, A. (2004) Weight-length relationships for 46 fish species of the Portuguese west coast. *Journal of Applied Ichthyology* **20**: 355-361.

Ulleweit, J., Stransky, C., & Panten, K. (2010) Discards and discarding practices in German fisheries in the North Sea and Northeast Atlantic during 2002-2008. *Journal of Applied Ichthyology* **26** Suppl. 1: 54-66

Walmsley, S.A., Leslie, R.W., & Sauer, W.H.H. (2007) Bycatch and discarding in the South African demersal trawl fishery. *Fisheries Research* **86**: 15-30.

Walmsley-Hart, S.A., Sauer, W.H.H. & Buxton, C.D. (1999) The biology of the skates *Raja wallacei* and *R. pullopunctata* (Batoidea: Rajidae) on the Agulhas Bank, South Africa. *South African Journal of Marine Science* **21**(1): 165-179.

**References used in the database**

List of references used in the database of non-target elasmobranch catch. References with asterisks contained data used in the retention rate dataset.

Afonso, A.S., Hazin, F.H.V., Carvalho, F., Pacheco, J.C., Hazin, H., Kerstetter, D.W., Murie, D., & Burgess, G.H. (2011) Fishing gear modifications to reduce elasmobranch mortality in pelagic and bottom longline fisheries off Northeast Brazil. *Fisheries Research* **108**: 336-343.

Amande, M.-J., Chassot, E., Chavance, P., & Pianet, R. (2008) Silky shark (Carcharhinus falciformis) bycatch in the French tuna purse-seine fishery of the Indian Ocean. Indian Ocean Tuna Commission. Working Party on Ecosystems and Bycatch 16 22 pp.

Amande, M.J., Ariz, J., Chassot, E., Delgado de Molina, A., Gaertner, D., Murua, H., Pianet, R., Ruiz, J., & Chavance, P. (2010) Bycatch of the European purse seine tuna fishery in the Atlantic Ocean for the 2003-2007 period. *Aquatic Living Resources* **23**: 353-362.

Ambrose, E.E., Solarin, B.B., Isebor, C.E., & Williams, A.B. (2005) Assessment of fish by-catch species from coastal artisanal shrimp beam trawl fisheries in Nigeria. *Fisheries Research* **71**: 125-135.

Anderson, O.F., & Clark, M.R. (2003) Analysis of bycatch in the fishery for orange roughy, Hoplostethus atlanticus, on the South Tasman Rise. *Marine and Freshwater Research* **54**: 643-652.

Bacheler, N.M., & Buckel, J.A. (2004) Does hook type influence the catch rate, size, and injury of grouper in a North Carolina commercial fishery? *Fisheries Research* **69**: 303-311.

\* Baeta, F., Batista, M., Maia, A., Costa, M.J., & Cabral, H. (2010) Elasmobranch bycatch in a trammel net fishery in the Portuguese west coast. *Fisheries Research* **102**: 123-129.

Banaru, D., Dekeyser, I., Imbert, G., & Laubier, L. (2010) Non-target and released alive by-catch distributions observed during French driftnet fishery in the northwestern Mediterranean Sea (2000-2003 database). *Journal of Oceanography, Research and Data* **3**: 33-45.

Baum, J.K., & Myers, R.A. (2004) Shifting baselines and the decline of pelagic sharks in the Gulf of Mexico. *Ecology Letters* **7**: 135-145.

Beerkircher, L.R., Cortes, E., & Shivji, M. (2002) Characterisitics of shark bycatch observed on pelagic longlines off the Southeastern United States, 1992-2000. *Marine Fisheries Review* **64**(4): 40-49.

Belcher, C.N., & Jennings, C.A. (2011) Identification and evaluation of shark bycatch in Georgia’s commercial shrimp trawl fishery with implications for management. *Fisheries Management and Ecology* **18**: 104-112.

\* Benson, A.J., McFarlane, G.A. & King, J.R. 2001. A Phase ‘0’ Review of Elasmobranch Biology, Fisheries, Assessment and Management. Fisheries and Oceans Science. Canadian Science Advisory Secretariat. Research Document 2001/129 70 pp.

\* Berkeley, S.A., & Campos, W.L. 1988. Relative Abundance and Fishery Potential of Pelagic Sharks Along Florida's East Coast. *Marine Fisheries Review* **50**(1): 9-16.

Beutel, D., Skrobe, L., Castro, K., Ruhle Sr., P., Ruhle Jr., P., O'Grady, J., & Knight, J. (2008) Bycatch reduction in the Northeast USA directed haddock bottom trawl fishery. *Fisheries Research* **94**: 190-198.

Bizzarro, J.J., Smith, W.D., Marquez-Farias, J.F., & Hueter, R.E. (2007) Artisanal fisheries and reproductive biology of the golden cownose ray, Rhinoptera steindachneri Evermann and Jenkins, 1891, in the northern Mexican Pacific. *Fisheries Research* **84**: 137-146.

Bizzarro, J.J., Smith, W.D., Marquez-Farias, Tyminski, J., & Hueter, R.E. (2009) Temporal variation in the artisanal elasmobranch fishery of Sonora, Mexico. *Fisheries Research* **97**: 103-117.

\* Bonfil, R. (1994) Overview of World Elasmobranch Fisheries. FAO Fisheries Technical Paper No. 341, FAO, Rome, Italy: 199 pp.

Bonfil, R. (1999) The dogfish (Squalus acanthias) fishery of British Columbia, Canada and its management. Case studies of the management of elasmobranch fisheries. Part 2, Chapter 21, ed. R. Shotton.. FAO Fisheries Technical Paper 378(2).

Bornatowksi, H., Simoes Vitule, J.R., Abilhoa, V., & Maia Correa, M.F. (2011) Unconventional fishing for large sharks in the state of Parana, southern Brazil: a note of concern. *Journal of Applied Ichthyology* **27**: 1108-1111.

\* Braccini, M., Van Rijn, J., & Frick, L. (2012) High post-capture survival for sharks, rays and chimaeras discarded in the main shark fishery of Australia? *PLoS One*. **7**(2): e32547.

Bremner, G., Johnstone, P., Bateson, T., & Clarke, P. (2009) Unreported bycatch in the New Zealand West Coast South Island hoki fishery. *Marine Policy* **33**: 504-512.

\* Bromhead, D., Clarke, S., Hoyle, S., Muller, B., Sharples, P., & Harley, S. (2012) Identification of factors influencing shark catch and mortality in the Marshall Islands tuna longline fishery and management implications. *Journal of Fish Biololgy* **80**: 1870-1894.

\* Campana, S.E., Joyce, W., & Manning, M.J. (2009) Bycatch and discard mortality in commercially caught blue sharks *Prionace glauca* assessed using archival satellite pop-up tags. *Marine Ecology Progress Series* **387**: 241-253.

\* Campana, S.E., Marks, L., & Joyce, W. 2004. Biology, fishery, and stock status of shortfin mako sharks (Isurus oxyrinchus) in Atlantic Canadian waters. Canadian Science Advisory Secretariat Research Document 2004/094 29 pp.

\* Campana, S.E., Marks, L., Joyce, W. & Kohler, N. 2005. Catch, by-catch and indices of population status of blue shark (Prionace glauca) in the Canadian Atlantic. International Commission for the Conservation of Atlantic Tunas 58(3): 891-934.

\* Carbonell, A., Alemany, F., Merella, P., Quetglas, A., & Roman, E. (2003) The by-catch of sharks in the western Mediterranean (Balearic Islands) trawl fishery. *Fisheries Research* **61**: 7-18

Carlson, J.K., & Baremore, I. (2002) The directed shark gillnet fishery: non-right whale season, 2000 and 2001. NMFS-SEFSC PCB-01/02-002 8 pp.

Carruthers, E.H., Schneider, D.C., & Neilson, J.D. (2009) Estimating the odds of survival and identifying mitigation opportunities for common bycatch in pelagic longline fisheries. *Biological Conservation* **142**: 2620-2630.

Castillo-Geniz, J.L., Marquez-Farias, J.F., Rodriguez de la Cruz, M.C., Cortes, E., & Cid del Prado, A. (1998) The Mexican artisanal shark fishery in the Gulf of Mexico: towards a regulated fishery. *Marine and Freshwater Research* **49**: 611-620.

Catchpole, T.L., Frid, C.L.J., & Gray, T.S. (2006) Resolving the discard problem - A case study of the English Nephrops fishery. *Marine Policy* **30**: 821-831.

\* Cedrola, P.V., Gonzalez, A.M., & Pettovello, A.D. (2005) Bycatch of skates (Elasmobranchii: Arhynchobatidae, Rajidae) in the Patagonian red shrimp trawl. *Fisheries Research* **71**: 141-150.

Ceyhan, T., Hepkafadar, O., & Tosunoglu, Z. (2010) Catch and size selectivity of small-scale fishing gear for the smooth-hound shark Mustelus mustelus. *Mediterranean Mammal Science* **11**(2): 231-223.

\* Chiaramonte, G.E. (1998) Shark fisheries in Argentina. *Marine and Freshwater Research* **49**: 601-609.

\* Clarke, M.W., Connolly, P.L., & Bracken, J.J. (2002) Catch, discarding, age estimation, growth and maturity of the squalid shark Deania calceus west and north of Ireland. *Fisheries Research* **56**: 139-153.

Clarke, M.W. (2000) Records of deep water chondrichthyan fish caught on long-line in the Rockall Trough. *Journal of the Marine Biological Association of the United Kingdom* **80**: 377-378.

\* Coelho,R., & Erzini, K. (2008) Effects of fishing methods on deep water shark species caught as bycatch off southern Portugal. *Hydrobiologia* **606**: 187-193.

\* Coelho, R., Bentes, L., Goncalves, J.M., Lino, P.G., Ribeiro, J. & Erzini, K. (2003) Reduction of elasmobranch by-catch in the hake semipelagic near-bottom longline fishery in the Algarve (Southern Portugal). *Fisheries Science* **69**: 293-299.

\* Coelho, R., Erzini, K., Bentes, L., Correia, C., Lino, P.G., Monteiro, P., Ribeiro, J., & Goncalves, J.M.S. (2005) Semi-pelagic longline and trammel net elasmobranch catches in southern Portugal: catch composition, catch rates and discards. *Journal of Northwest Atlantic Fisheries Science* **35**: 531-537.

\* Connolly, P.L., & Kelly, C.L. (1996) Catch and discards from experimental trawl and longline fishing in the deep water of the Rockall Trough. *Journal of Fish Biology* **49**: 132-144.

Courtney, A.J., Campbell, M.J., Roy, D.P., Tonks, M.L., Chilcott, K.E., & Kyne, P.M. (2008) Round scallops and square meshes: a comparison of four codend types on catch rates of target species and by-catch in the Queensland (Australia) saucer scallop (Amusium balloti) trawl fishery. *Marine and Freshwater Research* **59**: 849-864.

\* Courtney, D.L., & Sigler, M.F. (2007) Trends in area-weighted CPUE of Pacific Sleeper Sharks Somniosus pacificus in the Northeast Pacific Ocean determined from Sablefish longline surveys. *Alaska Fishery Research Bulletin* **12**(2): 292-316.

Curran, D., & Bigelow, K. (2011) Effects of circle hooks on pelagic catches in the Hawaii-based tuna longline fishery. *Fisheries Research* **109**: 265-275.

\* Damalas, D., & Vassilopoulou, V. (2011) Chondrichthyan by-catch and discards in the demersal trawl fishery of the central Aegean Sea (Eastern Mediterranean). *Fisheries Research* **108**: 142-152.

De Silva, J.A., Condrey, R.E., & Thompson, B.A. (2001) Profile of shark bycatch in the U.S. Gulf of Mexico Menhaden fishery. *North American Journal of Fisheries Management* **21**: 111-124.

Dicken, M.L., Smale, M.J., & Booth, A.J. (2006) Shark fishing effort and catch of the ragged-tooth shark Carcharias taurus in the South African competitive shore-angling fishery. *African Journal of Marine Science* **28**: 589-601.

\* Dolgov, A.V., Grekov, A.A., Shestopoal, I.P., & Sokolov, K.M. (2005) By-catch of skates in trawl and long-lone fisheries in the Barents Sea. *Journal of Northwest Atlantic Fisheries Science* **35**: 357-366.

Domingo, A., Menni, R.C., & Forselledo, R. (2005) Bycatch of the pelagic ray Dasyatis violacea in Uruguayan longline fisheries and aspects of distribution in the southwestern Atlantic. *Scientia Marina* **69**(1): 161-166.

\* Erzini, K., Goncalves, J.M.S., Bentes, L., Lino, P.G., & Ribeiro, J. (2001) The hake deepwater semi-pelagic (‘pedra-bola’) longline fishery in the Algarve (southern Portugal). *Fisheries Research* **51**: 327-336.

\* Estalles, M., Coller, N.M., Perier, M.R., & Di Giacomo, E.E. (2011) Skates in the demersal trawl fishery of San Matias Gulf, Patagonia: species composition, relative abundance and maturity stages. *Aquatic Living Resources* **24**: 193-199.

\* Evans, S.M., Hunter, J.E., Elizal, & Wahju, R.I. (1994) Composition and fate of the catch and bycatch in the Farne deep (North Sea) Nephrops fishery. *ICES Journal of Marine Science* **51**: 155-168.

Everett, B.I., & Fennessy, S.T. (2007) Assessment of recreational boat-angling in a large estaurine embayment in KwaZulu-Natal, South Africa. *African Journal of Marine Science* **29**(3): 411-422.

Fortuna, C.M., Vallini, C., Filidei Jr., E., Ruffino, M., Consalvo, I., Di Muccio, S., Gion, C., Scacco, V., Tarulli, E., Giovanardi, O., & Mazzula, A. (2010) By-catch of cetaceans and other species of conservation concern during pair trawl fishing operations in the Adriatic Sea (Italy). *Chemistry and Ecology* **26**: 65-76.

\* Fowler, G.M., & Campana, S.E. (2009) Commercial by-catch of blue shark (Prionace glauca) from longline fisheries in the Canadian Atlantic. International Commission for the Conservation of Atlantic Tunas 64(5): 1650-1667.

\* Fowler, G.M., & Campana, S.E. (2009a). Commercial by-catch rates of shortfin mako (Isurus oxyrinchus) from longline fisheries in the Canadian Atlantic. International Commission for the Conservation of Atlantic Tunas 64(5): 1668-1676.

Francis, M.P., & Duffy, C. (2002) Distribution, seasonal abundance and bycatch of basking sharks (Cetorhinus maximus) in New Zealand, with observations on their winter habitat. *Marine Biology* **140**: 831-842.

Francis, M.P., & Shallard, B. (1999) New Zealand shark fishery management. Case studies of the management of elasmobranch fisheries. Part 2, Chapter 18, ed. R. Shotton.. FAO Fisheries Technical Paper 378(2).

Fromentin, J.-M., & Farrugio, H. (2005) Results of the 2003 observer program on board the french purse seiner targeting Atlantic bluefin tuna in the Mediterranean Sea. International Commission for the Conservation of Atlantic Tunas **58**(2): 779-782.

Gocke, G., & Metin, C. (2007) Landed and discarded catches from commercial prawn trammel net fishery. *Journal of Applied Ichthyology* **23**: 543-546.

Gonener, S., & Bilgin, S. (2009) The effect of pingers on harbour porpoise, Phocena phocena bycatch and fishing effort in the turbot gill net fishery in the Turkish Black Sea Coast. *Turkish Journal of Fisheries and Aquatic Sciences* **9**: 151-157.

Gordon, J.D.M. (1999) Management considerations of deep-water sharks fisheries. Case studies of the management of elasmobranch fisheries. Part 2, Chapter 25, ed. R. Shotton.. FAO Fisheries Technical Paper 378(2).

Graham, L.J., Murphy, B.R., & Hata, D. (2009) Using species composition data from a trawl survey to determine potential bycatch of the commercial trawl fishery for horseshoe crab Limulus polyphemus in the Middle Atlantic Bight. *North American Journal of Fisheries Management* **29**: 478-487.

Gray, C.A. (2002) Management implications of discarding in an estaurine multi-species gill net fishery. *Fisheries Research* **56**: 177-192.

\* Hale, L.F., Hollensead, L.D., & Carlson, J.K. (2007) Characterization of the shark bottom longline fishery: 2007. NMFS Tech Memo (SEFSC) 564 1-25.

Hanson, D.L. (1999) Management of shark fisheries off the west coast of the USA. Case studies of the management of elasmobranch fisheries. Part 2, Chapter 22, ed. R. Shotton.. FAO Fisheries Technical Paper 378(2).

Harry, A.V., Tobin, A.J., Simpfendorfer, C.A., Welch, D.J., Mapleston, A., White, J., Williams, A.J., & Stapley, J. (2011) Evaluating catch and mitigating risk in a multispecies, tropical, inshore shark fishery within the Great Barrier Reef World Heritage Area. *Marine and Freshwater Research* **62**: 710-721.

Hernandez, S., Gonzalez, M.T., Villarroel, J.C., & Acuna, E. (2010) Seasonal variation in fish bycatch associated with an artisanal flounder fishery on Coquimbo Bay, Chile. *Revista de Biologia Marina y Oceanografia (Suppl. 1)* **45**: 695-703.

\* Hobsbawn, P.I., & Wilson, D.T. (2009) Australian national report to the scientific committee of the Indian Ocean Tuna Commission for 2009. Report to the Indian Ocean Tuna Commission. Australian Bureau of Agricultural and Resource Economics. Bureau of Rural Sciences, Canberra. 18 pp.

Huang, H.-W., & Liu, K.-M. (2010) Bycatch and discards by Taiwanese large-scale tuna longline fleets in the Indian Ocean. *Fisheries Research* **106**: 261-270.

\* Jones, A.A., Hall, N.G., & Potter, I.C. (2010) Species compositions of elasmobranchs caught by three different commercial fishing methods off southwestern Australia, and biological data for four abundant bycatch species. *Fishery Bulletin* **108**: 365-381.

Kaimmer, S., & Stoner, A.W. (2008) Field investigation of rare-earth metal as a deterrent to spiny dogfish in the Pacific halibut fishery. *Fisheries Research* **94**: 43-47.

Kennelly, S.J., Drew, S.C., & Gagnon, C.D.D. (1997) Rates of retained and discarded catches from demersal fish trawling off the north-eastern United States. *Marine and Freshwater Research* **48**: 185-199.

Kennelly, S.J., Liggins, G.W., & Broadhurst, M.K. (1998) Retained and discarded by-catch from oceanic prawn trawling in New South Wales, Australia. *Fisheries Research* **36**: 217-236.

King, S.E., Hannah, R.W., Parker, S.J., Matteson, K.M., & Berkeley, S.A. (2004) Protecting rockfish through gear design: development of a selective flatfish trawl for the U.S. west coast bottom trawl fishery. *Canadian Journal of Fisheries and Aquatic Science* **61**: 487-496.

Lamberth, S.J. (2006) White shark and other chondrichthyan interactions with the beach-seine (treknet) fishery in False Bay, South Africa. *African Journal of Marine Science* **28**: 723-727.

Lawson, T. (2001) Observer data held by the oceanic fisheries programme covering tuna fishery bycatches in the Western and Central Pacific Ocean. Standing Committee on Tuna and Billfish SWG-9 40 pp.

Macbeth, W.G., Geraghty, P.T., Peddemors, V.M., & Gray, C.A. (2009) Observer-based study of targeted commercial fishery for large shark species in waters off northern New South Wales. Industry and Investment New South Wales Fisheres Final Report No. 114 82 pp.

Marin, Y.H., Brum, F., Barea, L.C., & Chocca, J.F. (1998) Incidental catch associated with swordfish longline fisheries in the south-west Atlantic Ocean. *Marine and Freshwater Research* **49**: 633-639.

Matsunaga, H., & Nakano, H. (1999) Species composition and CPUE of pelagic sharks caught by Japanese longline research and training vessels in the Pacific Ocean. *Fisheries Science* **65**(1): 16-22.

McKinnell, S., & Seki, M.P. (1998) Shark bycatch in the Japanese high seas squid driftnet fishery in the North Pacific Ocean. *Fisheries Research* **39**: 127-138.

Megalofonou, P., Yannopoulous, C., Damalas, D., De Metrio, G., Deflorio, M., de la Serna, J.M., & Macias, D. (2005) Incidental catch and estimated discards of pelagic sharks from the swordfish and tuna fisheries in the Mediterranean Sea. *Fishery Bulletin* **103**: 620-634.

\* Moranta, J., Massuti, E., & Morales-Nin, B. (2000) Fish catch composition of the deep-sea decapod crustacean fisheries in the Balearic Islands (western Mediterranean). *Fisheries Research* **45**: 253-264.

Morgan, A., & Carlson, J.K. (2010) Capture time, size and hooking mortality of bottom longline-caught sharks. *Fisheries Research* **101**: 32-37.

Nakano, H. (1999) Fishery management of sharks in Japan. Case studies of the management of elasmobranch fisheries. Part 2, Chapter 19, ed. R. Shotton.. FAO Fisheries Technical Paper 378(2).

\* O’Brien, J.W., & Sunada, J.S. (1994) A review of the Southern California experimental drift longline fishery for sharks, 1988-1991. CalCOFI Report 35: 222-229.

\* Pajuelo, J.G., Gonzalez, J.A., & Santana, J.I. (2010) Bycatch and incidental catch of the black scabbardfish (Aphanopus spp.) fishery off the Canary Islands. *Fisheries Research* **106**: 448-453.

Pawson, M., & Vince, M. (1999) Management of shark fisheries in the northeast Atlantic. Case studies of the management of elasmobranch fisheries. Part 1, Chapter 1, ed. R. Shotton.. FAO Fisheries Technical Paper 378(1).

Perez, J.A.A., & Wahrlich, R. (2005) A bycatch of the gillnet monkfish Lophius gastrophysus fishery off southern Brazil. *Fisheries Research* **72**: 81-95.

\* Petersen, S.L., Honig, M.B., Ryan, P.G., Underhill, L.G., & Compagno, L.J.V. (2009) Pelagic shark bycatch in the tuna- and swordfish-directed longline fishery off southern Africa. *African Journal of Marine Science* **31**(2): 215-225.

\* Revill, A.S., Dulvy, N.K., & Holst, R. (2005) The survival of discarded lesser-spotted dogfish (Scyliorhinus canicula) in the Western English Changgel beam trawl fishery. *Fisheries Research* **71**: 121-124.

Rodriguez, J.G.V., & Leon, M.J.D. (2002) A first approach to the management of the incidental catch of the eastern Pacific Mexican tuna fleet. *Hydrobiologia* **12**(1): 47-60.

Rogan, E., & Mackey, M. (2007) Megafauna bycatch in drift nets for albacore tuna in the NE Atlantic. *Fisheries Research* **86**: 6-14.

Sanchez, P., Demestre, M., & Martin, P. (2004) Characterization of the discards generated by bottom trawling in the northwestern Mediterranean. *Fisheries Research* **67**: 71-80.

Stephen, J.A., & Harris, P.J. (2010) Commerical catch composition with discard and immediate release mortality proportions off the southeastern coast of the United States. *Fisheries Research* **103**: 18-24.

Stevens, J.D. (1992) Blue and Mako Shark by-catch in the Japanese longline fishery off South-eastern Australia. *Australian Journal of Marine and Freshwater Research* **43**: 227-236.

Stobutzki, I.C., Miller, M.J., Jones, P., & Salini, J.P. (2001) Bycatch diversity and variation in a tropical Australian penaeid fishery; the implications for monitoring. *Fisheries Research* **53**: 283-301.

Stobutzki, I.C., Miller, M.J., Heales, D.S., & Brewer, D.T. (2002) Sustainability of elasmobranchs caught as bycatch in a tropical prawn (shrimp) trawl fishery. *Fishery Bulletin* **100**: 800-821.

Storai, T., Zinzula, L., Repetoo, S., Zuffa, M., Morgan, A., & Mandelman, J. (2011) Bycatch of large elasmobranchs in the traditional tuna traps (tonnare) of Sardinia from 1990 to 2009. *Fisheries Research* **109**: 74-79.

Sumpton, W.D., Taylor, S.M., Gribble, N.A., McPherson, G., & Ham, T. (2011) Gear selectivity of large-mesh nets and drumlines used to catch sharks in the Queensland Shark Control Program. *African Journal of Marine Science* **33**(1): 37-43.

Swamy, K. (1999) Shark fisheries in Fiji: their management and issues of future concerns. Case studies of the management of elasmobranch fisheries. Part 2, Chapter 20, ed. R. Shotton.. FAO Fisheries Technical Paper 378(2).

\* Tamini, L.L., Chiaramonte, G.E., Perez, J.E., & Cappozzo, H.L. (2006) Batoids in a coastal trawl fishery in Argentina. *Fisheries Research* **77**: 326-332.

\* Thorpe, T., & Frierson, D. (2009) Bycatch mitigation assessment for sharks caught in coastal anchored gillnets. *Fisheries Research* **98**: 102-112.

Tonks, M.L., Griffiths, S.P., Heales, D.S., Brewer, D.T., & Dell, Q. (2008) Species composition and temporal variation of prawn trawl bycatch in the Joseph Bonaparte Gulf, northwestern Australia. *Fisheries Research* **89**: 276-293.

Trent, L., Parshley, D.E., & Carlson, J.K. (1997) Catch and bycatch in the shark drift gillnet fishery off Georgia and East Florida. *Marine Fisheries Review* **59**(1): 19-28.

Tzanatos, E., Somarakis, S., Tserpes, G., & Koutsikopoulos, C. (2007) Discarding practices in a Mediterranean small-scale fishing fleet (Patraikos Gulf, Greece). *Fisheries Management and Ecology* **14**: 277-285.

\* Ulleweit, J., Stransky, C., & Panten, K. (2010) Discards and discarding practices in the North Sea and Northeast Atlantic during 2002-2008. *Journal of Applied Ichthyology* **26**: 54-66.

\* Van der Molen, S., Caille, G., & Gonzalez, R. (1998) By-catch of sharks in Patagonian coastal trawl fisheries. *Marine and Freshwater Research* **49**: 641-644.

Vega, R., Licandeo, R., Rosson, G., & Yanez, E. (2009) Species catch composition, length structure, and reproductive indices of swordfish (Xiphias gladius) at Easter Island zone. *Latin American Journal of Aquatic Research* **37**(1): 83-95.

\* Walker, T.I., Hudon, R.J., & Gason, A.S. (2005) Catch evaluation of target, by-product and by-catch species taken by gillnets and longlines in the shark fishery of south-eastern Australia. *Journal of Northwest Atlantic Fisheries Science* **35**: 505-530.

\* Walmsley, S.A., Leslie, R.W., & Sauer, W.H.H. (2007) Bycatch and discarding in the South African demersal trawl fishery. *Fisheries Research* **86**: 15-30.

Ward, P., Lawrence, E., Darbyshire, R., & Hindmarsh, S. (2008) Large-scale experiment shows that nylon leaders reduce shark bycatch and benefit pelagic longline fishers. *Fisheries Research* **90**: 100-108.

Wetherbee, B.M., (2000) Assemblage of deep-sea sharks on Chatham Rise, New Zealand. *Fishery Bulletin* **98**: 189-198.

White, W.T., Giles, J., Dharmadi, & Potter, I.C. (2006) Data on the bycatch fishery and reproductive biology of mobulid rays (Myliobatiformes) in Indonesia. *Fisheries Research* **82**: 65-73.

Whoriskey, S., Arauz, R., & Baum, J.K. (2011) Potential impacts of emerging mahi-mahi fisheries on sea turtle and elasmobranch bycatch species. *Biological Conservation* **144**: 1841-1849.

Williams, P.G. (1999) Shark and related species catch in tuna fisheries of the tropical western and central Pacific Ocean. Case studies of the management of elasmobranch fisheries. Part 2, Chapter 27, ed. R. Shotton.. FAO Fisheries Technical Paper 378(2).

Ye, Y., Alsaffar, A.H., & Mohammed, H.M.A. (2000) Bycatch and discards of the Kuwait shrimp fishery. *Fisheries Research* **45**: 9-19.

Zeeberg, J., Corten, A., & de Graaf, E. (2006) Bycatch and release of pelagic megafauna in industrial trawler fisheries of Northwest Africa. *Fisheries Research* **78**: 186-195.