# Skate Discard Mortality Rate Review

# SSC Meeting
# June 2011

# Stobutzki et al. (2002)

- N. Australian Prawn Trawl Fishery
- October 1998 research survey (30-min tows)
- Depth range 15-40 m
- Catch classified as alive or dead when landed on deck (at-vessel mortality)

- 56 elasmobranch species sampled (N=847)
    - 99 Dasyatid rays
    - 34 Gymnurid butterfly rays
    - 59 Rhynchobatid guitarfish

- Pooled Mean Mortality Rate for Rays = 40% (10-59%)
- Additional factors:  fish size, sex

# Laptikhovsky (2004)

- Falkland Islands Squid Trawl Fishery
- Single fishing trip observed
- Depth range 80-190 m, SST range 8.7-9.2 C
- Skates culled from commercial catch and placed in a fish bin with flowing seawater for up to 200 min
- At-vessel “stamina index”

- 8 skate species sampled (N=66)
    - N = 2-16 per species

- Pooled Mean Mortality Rate = 40.9% (25-100%)
- Additional factors:  sex

# Benoit (2006)

- 2005 DFO Trawl Research Survey (2 vessels)
- Depth range 22-337 m
- Catch classified as alive or dead (based on respiration) when sampled on deck (at-vessel mortality)
- Recorded time out-of-water
- Biomass in each tow 18-816 kg

- Winter skate (N=25), augmented with data from thorny and smooth skates

- ~50% mortality after 1-2 h out of water
- Additional factors: species effect (thorny mortality < smooth)

# Enever et al. (2009)

- Bristol Channel, UK, Skate Trawl Fishery
- 7 commercial trips sampled (32 tows), May-Aug 2007
- Depth range 30-60 m
- Short tows (0.75-2.0 h) vs. Long tows (2.7-4.3 h)
- Skates culled from catch and placed in on deck holding tanks for up to 64 h
- “Health score”

- 5 skate species sampled (N=162)
    - Short tow N = 1-34 per species
    - Long tow N = 6-68 per species

- Pooled Mean Mortality Rate = 45% (41-67%)
- Additional factors:  health score, tow weight

# Benoit et al. (2010)

- Gulf of St. Lawrence Scallop Dredge Fishery
- 624 sets (~19-min each) observed on 24 trips, 2006-2008
- Correlated skate “vitality index” to mortality rate based on previous observations/experiments in trawl gear
- Skates placed in on deck holding tanks up to 48 h

- 3 skate species sampled (N=152)
    - 4 winter skates
    - 22 smooth skates
    - 126 thorny skates

- Assumed Mortality Rate = 10% (based on vitality)

# Mandelman & Sulikowski (in progress)

- Gulf of Maine groundfish bottom trawl
- 32 tows (17 2-h tows, 15 4-h tows)
- Different seasons (winter vs. summer)
- Skates placed in cages for 72 h

- Winter Skate N = 203
- Little Skate N = 243

- At-vessel mortality ~0%
- Pooled Mean Mortality Rates (72-h post-release)
    - Winter skate = 12% (0-33% per tow)
    - Little skate = 20% (0-100% per tow)

- Additional factors:  condition factor, sex

# Study design

## Stepwise logistic regression model

**Predictor variables (by species)**

- Animal size
- Season (month)
- Depth of tow
- Tow duration (20, 120, 240 min)
- Tow weight
- Condition index (1-3)
- “Picking”?
- Cage-by-cage effects (within a tow replicate)
- Deck time*
- Thermal differential

**Dependent variable**

- Mortality

Each species modeled independently