Analytic Challenges Associated with Electronic Monitoring

May 7, 2014

Topics in Today's Presentation

- Background: Raw data requirements
- Meeting raw data requirements
- Combining ASM and EM data
- Examples of execution in the context of quota monitoring and stock assessment

Characterizing Removals

	Stock Assessment	Quota Monitoring
Quantity	Total number caught at age (discards, landings)	Total weight caught (by management component)
Application	Estimates of fishing mortality, stock size at age	Evaluation with respect to Annual Catch Limits (and subquotas/allocation; management targets)
Timeliness	Annual	Near-real time to annual

Characteristics and Resolution of Raw Data to Characterize Discards for Stock Assessments

1. Species identification
2. Statistical area to derive stock area
3. Gear type/mesh size
4. Calendar quarter (month)
5. Weight
6. Length, age composition

Characteristics of Raw Data – Discards for Stock Assessments

Characteristic	Dockside Monitoring	Vessel Trip Report
Species identification	Monitor	Fisherman
Statistical area to derive stock area	Catch separation/labelling, or VTR proration	VTR
Gear type/mesh size	Catch separation/labelling, or VTR proration	VTR
Calendar quarter/month	Monitor	VTR
Weight	Direct	Indirect or direct
Length composition	Direct	EM?
Age composition	Possible	Unlikely

1. Species Identification

- Non-target species should be included
  - E.g., yellowtail flounder in sea scallop fishery; haddock in Atlantic herring fishery; skates, spiny dogfish, monkfish in groundfish fishery
  - Need to attribute catch of other managed species to respective ACLs.
  - Consistent with ecosystem approach

5. Weight

- Accurate weight estimates are needed to apply ratio estimators
- (weight of species i discarded/weight of all species kept)* total weight of all species kept in the stratum
- Stratum, for stock assessment =
  - species
  - stock area
  - gear type mesh size
  - disposal (kept, discarded)
- For ACE monitoring, stratum also includes sector
- Accurate weight estimates also needed for discard accounting methods, e.g., actual discard for trip

Analytic Challenges: Combining ASM and EM

- ASM substantially increases precision over SBRM/NEFOP alone

Effect of ASM sampling on CV of Gulf of Maine haddock discard

	2009	2013
	NEFOP	NEFOP plus ASM
Longline discard	0.81	0.28
Trawl discard	0.34	0.14
Gillnet discard	0.27	0.10

Effect on CVs of non-target species likely similar

Analytic Challenges: Combining ASM and EM

- Highly desirable to be able to combine ASM and EM data to develop more precise estimates
- However, detailed comparison of discard ratios and length frequency information between SBRM/ASM vs. EM data will be required before EM can replace ASM estimates
  - Similar values (bias)
  - Similar distributions (variance, skew)

Analytic Challenges: ASM and EM

- If EM cannot replace ASM, lower scientific precision will affect stock assessments and management advice.
- EM data may cost less, but lowered precision is also a cost, because increased uncertainty will decrease ACLs.
- Consider this cost, at least qualitatively; ideally, use management strategy evaluation (MSE) to consider cost quantitatively.

Examples: integrating EM into existing systems

- Current system: observed ASM (and NEFOP) trips generate data for that specific trip, as well as contributing data to the ratio estimator for the sector stratum.
- That ratio estimator is used to estimate discard for unobserved trips in the sector stratum.
- (discarded single stock weight/ total weight of all kept species) * total landed weight of all species in the stratum

Examples: integrating EM into existing systems

- Vessel uses EM and associated data collection procedures during all trips; can be selected for SBRM trip
  - No potential “observer” bias
  - Data serve as census for vessel: vessel-specific discard amount
  - Random subsample of trips used to generate input to ratio estimator for stratum for “unobserved” trips
    - EM is not for everyone
  - EM data evaluated for compliance (all trips)
  - Non-compliant trips eliminated from ratio estimator, trip-specific amount based on ratio estimator

Examples: integrating EM into existing systems

- All sector or sector stratum vessels use EM and associated data collection procedures during all trips; can be selected for SBRM trip
  - No potential “observer” bias
  - Data serve as census for vessel: vessel-specific discard amount
  - If all vessels in sector or sector stratum used EM, no need for ratio estimator except for non-compliant trips – close to census.
  - EM data evaluated for compliance (all trips)
  - Trip-specific amount based on ratio estimator from compliant trips.

Examples of many outstanding questions

- How will the timing of the delivery of EM information affect the ability to estimate total catch?
- This will include swings in the discard rate as there will be lags in determination of compliance and changes in the discard rate as data from trips determined to be non-compliant are removed from the estimates.
- What constitutes compliance? What constitutes a “red flag”? How long will it take before the compliance rate stabilizes?

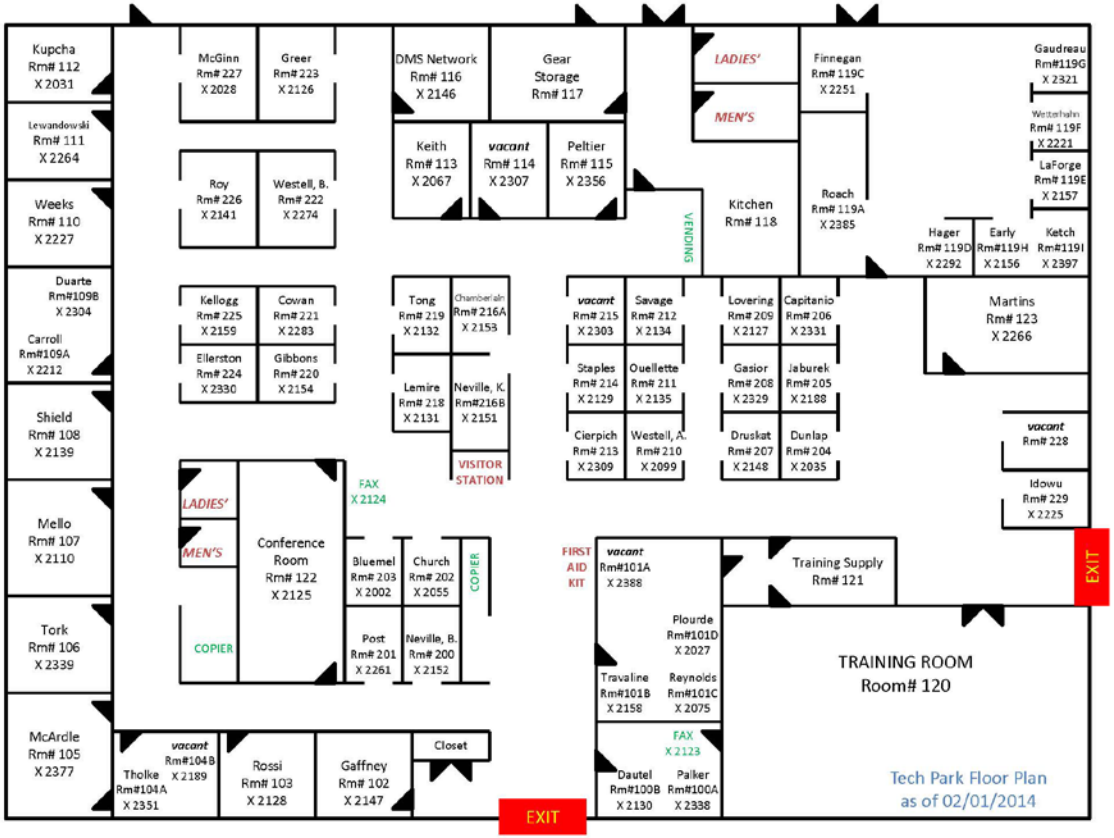
Examples of many outstanding questions

- How good is the correspondence between SBRM/ASM and EM data?
- How much video should be monitored? Should the rate be contingent on the quality of observations to date?
- Your outstanding questions?

Examples: integrating EM into existing systems

EM for sector discard rates

- Directly substitute an EM trip for an ASM trip: not recommended
  - Vessel phones in to PTNS (may be selected for SBRM coverage)
  - If vessel is selected for ASM, turns on EM and associated data collection procedures to generate input for the stratum ratio estimator for “unobserved” trips and trip-specific data
  - Potential “observer” bias
  - EM data evaluated for compliance for much or all of trip
  - Non-compliant trips eliminated from ratio estimator, trip-specific amount based on ratio estimator

Future

- Facility houses about 15 FTE and 50 contract employees.