Personal Transportation in Rural Alaska

Results from two questionnaires

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Picture courtesy Cady Lister
Research Questions

• Fuel amount
  – How much of total energy use is transportation?
  – Potential for displacement of fossil fuel?

• Vehicle inventory
  – How many (different) vehicles/household?
  – What are the vehicles used for?
  – How old?

• Energy Efficiency
  – Potential for improvement?

• Cost of Subsistence
  – Persistent data gap - frequent need for analysis
54 households
March 2010
field trip

207 households interviewed
Jan – Dec 2011
ADFG subsistence survey
“Most own just 1 ATV, likely more than 1 snowmachine and more than 1 boat”

Norton Sound, 2010
“Snowmachines & ATVs are newest – boat engines are oldest”

Norton Sound

- n = 47 (snowmachines)
- n = 51 (ATVs)
- n = 69 (boats)

- up to 5 years old
- 5 - 10 years old
- 11 – 20 years old
- 21 – 30 years old
- more than 30 years old
One-way distance to subsistence location & annual subsistence related mileage per household in Norton Sound

- **Snowmachines**
  - Average: 23 miles
  - Max: 128 miles

- **Boats**
  - Average: 10 miles
  - Max: 85 miles

- **ATVs**
  - Average: 6 miles
  - Max: 18 miles

- **Annual subsistence related mileage**
  - Average: 774 miles
  - Max: 3,969 miles

- **Annual subsistence related mileage**
  - Average: 416 miles
  - Max: 3,474 miles

- **Annual subsistence related mileage**
  - Average: 172 miles
  - Max: 576 miles
“Most use little – few use a lot ”

Annual subsistence related gasoline consumption by household
Norton Sound

- Snowmobile
- Boat
- ATV

Gallons/year

Locations:
- Golovin
- Koyuk
- Shaktoolik
- White Mountain
remote communities

(near) road accessible communities

Study Area
Major Cities
Roads

N

0 110
Miles
Average annual gasoline consumption/ hh by vehicle in remote rural Alaska

Norton Sound

- ATV: 299 gal, 23%
- Boat: 327 gal, 25%
- Snow machine: 665 gal, 52%

1,291 gallons/year

Interior

- ATV: 249 gal, 22%
- Boat: 435 gal, 37%
- Snow machine: 478 gal, 41%

1,162 gallons/year

The average household in Norton Sound burns 886 gallons of stove oil and 4 cords of wood. The average hh size in Norton Sound equals 4 persons.
Average annual gasoline consumption/hh by vehicle

Interior, 2011

**Remote**
- ATV: 249 gal (22%)
- Boat: 435 gal (37%)
- Snow machine: 478 gal (41%)

Total: 1,162 gallons

**Near (road accessible)**
- Car: 449 gal (56%)
- Snow machine: 129 gal (16%)
- Boats: 171 gal (21%)
- ATV: 53 gal (7%)

Total: 802 gallons/year
Average annual gasoline consumption/ hh by vehicle for subsistence harvesting and other uses

Norton Sound, 2010

- Snowmachines harvesting: 149 gal (12%)
- Snowmachines other use: 515 gal (40%)
- ATVs harvesting: 71 gal (5%)
- ATVs other use: 227 gal (18%)
- Boats harvesting: 157 gal (12%)
- Boats other use: 171 gal (13%)
Mean miles per gallon on subsistence trips

Norton Sound

<table>
<thead>
<tr>
<th>Mode</th>
<th>4-stroke</th>
<th>2-stroke</th>
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</thead>
<tbody>
<tr>
<td>Snowmachines</td>
<td>6.1</td>
<td>6.8</td>
</tr>
<tr>
<td>Boats</td>
<td>5.8</td>
<td></td>
</tr>
<tr>
<td>ATVs</td>
<td>4.8</td>
<td></td>
</tr>
</tbody>
</table>

n=146, n=61, n=54, n=15
“The mean mpg measure shown previously may not tell us much. Efficiency depends on hunting success, weather, etc.”

Note, bars in bold show median of mpg on hunting trips in Norton Sound, 2010.
2 stroke vs. 4 stroke snowmachines

2-stroke:
- lower up front cost
- 12-18 oil changes/winter plus oil for mixture

4-stroke:
- expensive parts
- only 3 oil changes/winter
- No need for gas mixture
Conclusions

• Consumption varies among households and location

• Snowmachines (long haul)
  – limited durability
  – efficiency potential

• Boats (mid distance)
  – longer useful life of engines
  – mostly 4-stroke

• ATVs (within village)
  – most suitable for integration of renewables

• More research needed
  – new 2-stroke and 4-stroke snowmachines and their efficiency
  – data collection in other locations in Alaska, SW and SE
  – cost of subsistence,