

# EXPANDING TELEAUDIOLOGY IN RURAL ALASKA: AN EHDI PILOT PROGRAM

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Annette Callies  
No conflicts of interest



Samantha Kleindienst Robler  
No conflicts of interest

CONFLICT OF INTEREST

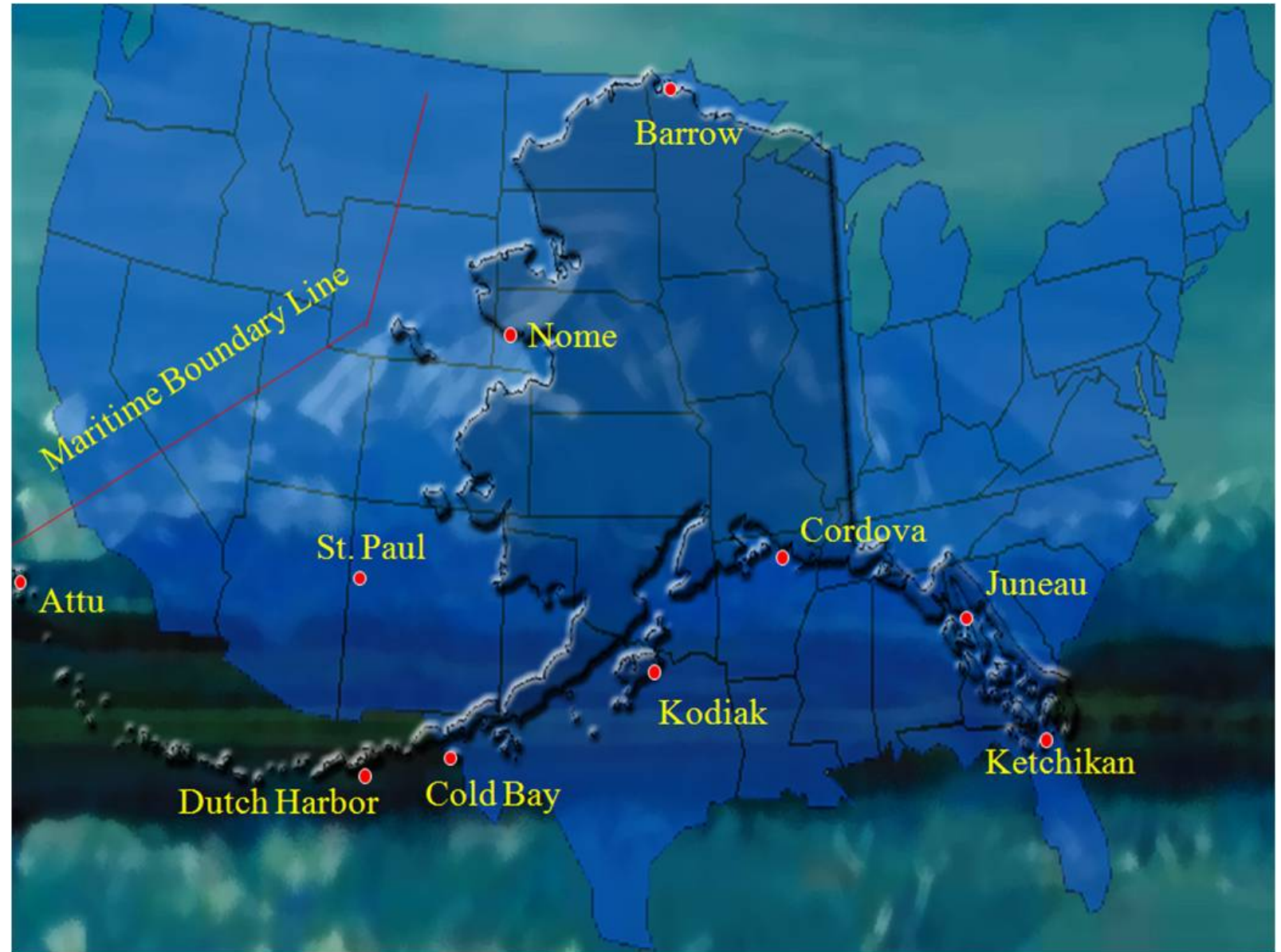
# AUDIENCE

- Name
- Location
- Specialty
- Goal for attending session





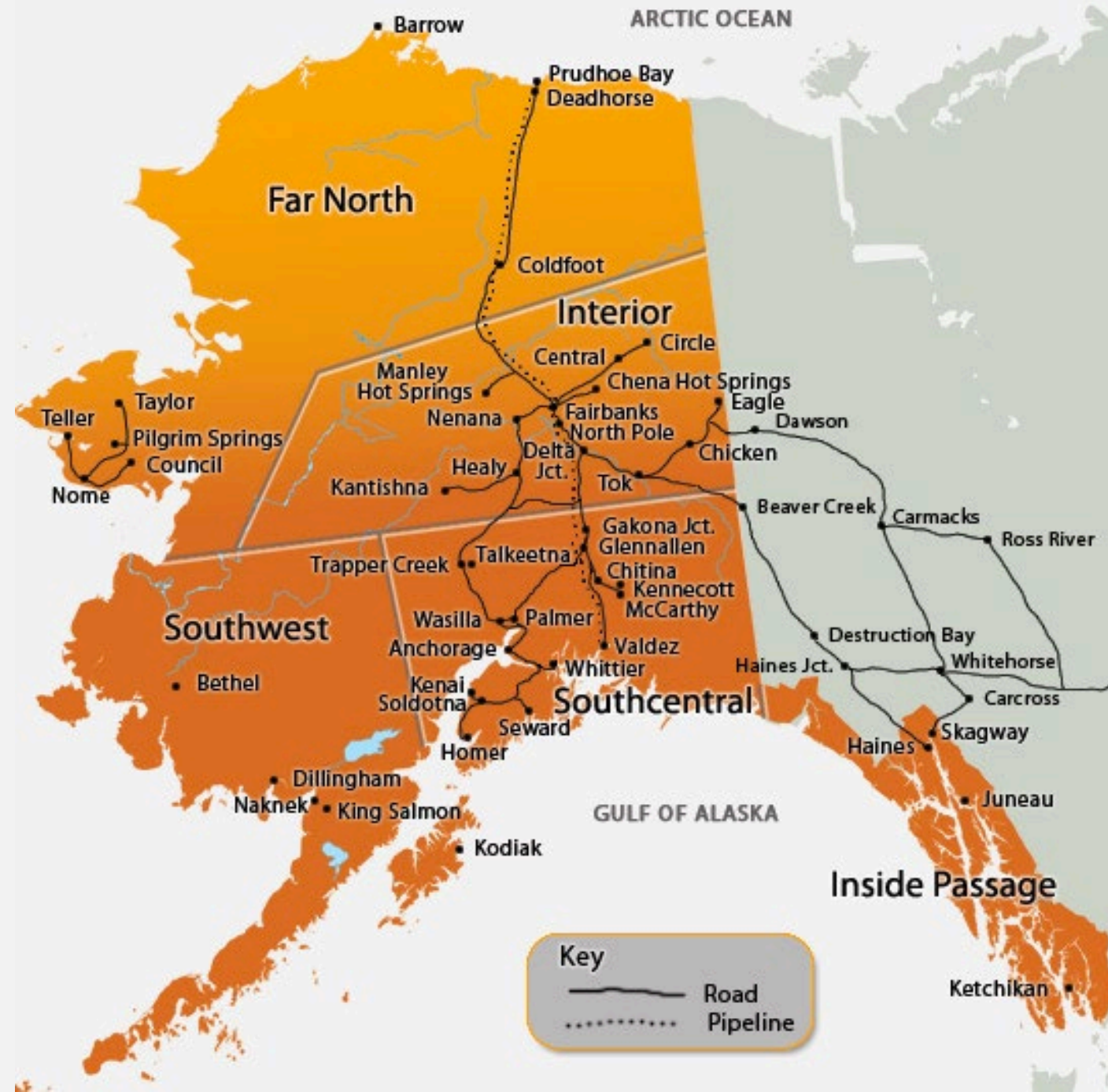
Alaska Size  
comparison



[IMAGE FROM: COAST GUARD COMPASS](#) OFFICIAL BLOG OF THE U.S. COAST GUARD



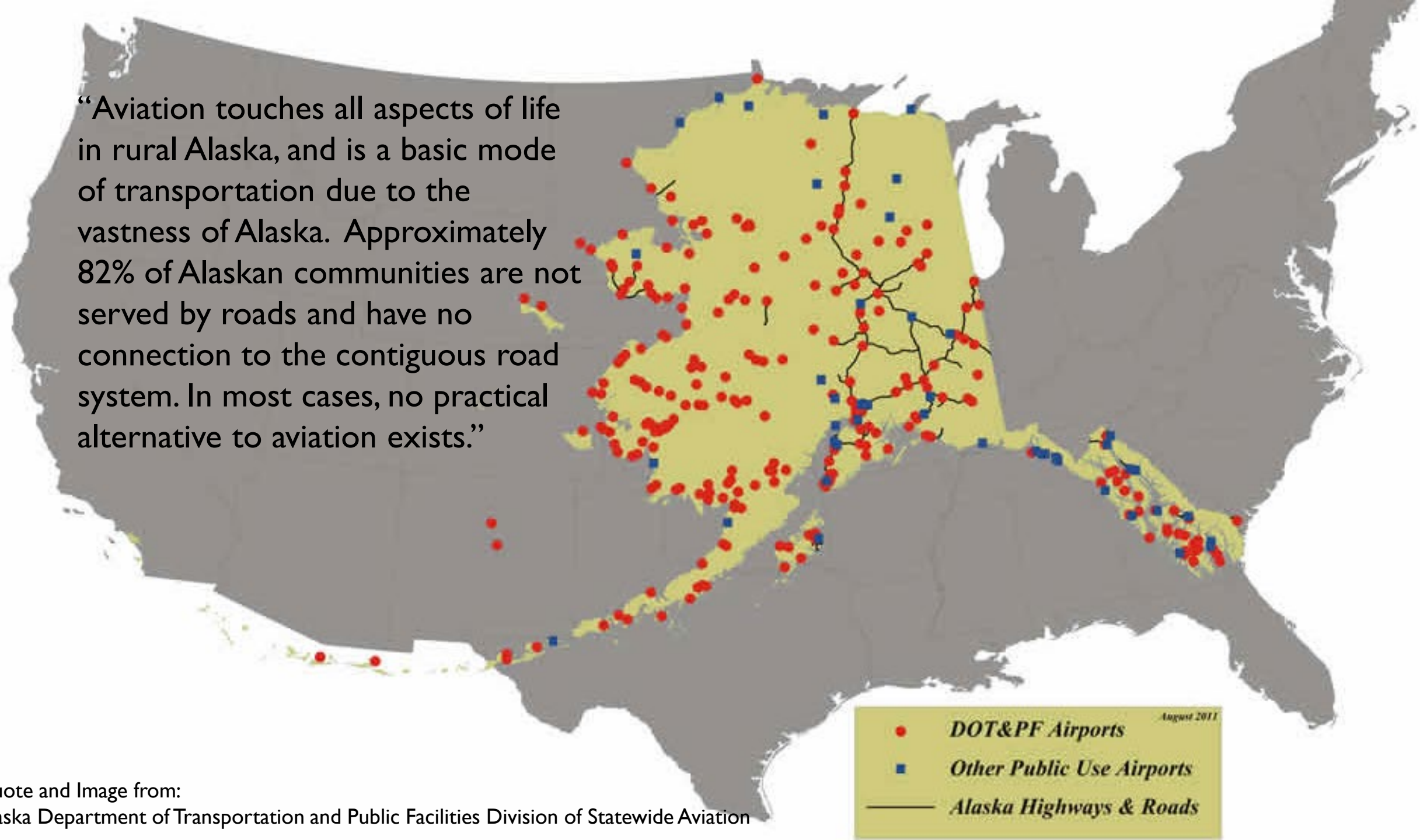
“The difference between rural Alaska and “any other rural area” is that in other states, people can drive to the nearest large town to obtain services. Commuting is generally not an option for the people of rural Alaska; there are fewer miles of road in Alaska than in any other state.”



Quote from  
[https://www.commerce.alaska.gov/web/Portals/4/pub/RiskMAP/2018\\_Alaska\\_Mapping\\_Business\\_Plan\\_Appendix\\_FINAL.pdf](https://www.commerce.alaska.gov/web/Portals/4/pub/RiskMAP/2018_Alaska_Mapping_Business_Plan_Appendix_FINAL.pdf)

Image taken from:  
<http://www.travelalaska.com/getting%20around/travel%20within%20alaska/by%20car%20rv%20motorhome.aspx>

“Aviation touches all aspects of life in rural Alaska, and is a basic mode of transportation due to the vastness of Alaska. Approximately 82% of Alaskan communities are not served by roads and have no connection to the contiguous road system. In most cases, no practical alternative to aviation exists.”

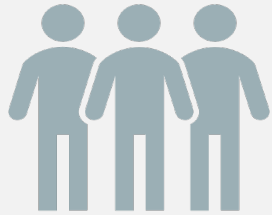


August 2011

- DOT&PF Airports
- Other Public Use Airports
- Alaska Highways & Roads

Quote and Image from:  
Alaska Department of Transportation and Public Facilities Division of Statewide Aviation

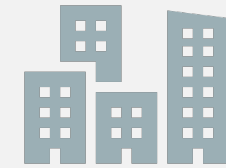
## COMMUNITY SIZE



**Over half (55%) of municipalities are extremely small with populations less than 500 residents**



**13% are less than 100 residents**



**Only six municipalities (4%) contain 30,000 residents or more including the:**

Juneau, Fairbanks, Kenai Peninsula, Mat-Su, and Anchorage



AIR TRAVEL TO  
REMOTE SITES IN  
ALASKA

[Alaska Statute 02.35.110 Emergency Rations & Equipment](#) requires that an airman may not make a flight inside the state with an aircraft unless emergency equipment is carried as follows:

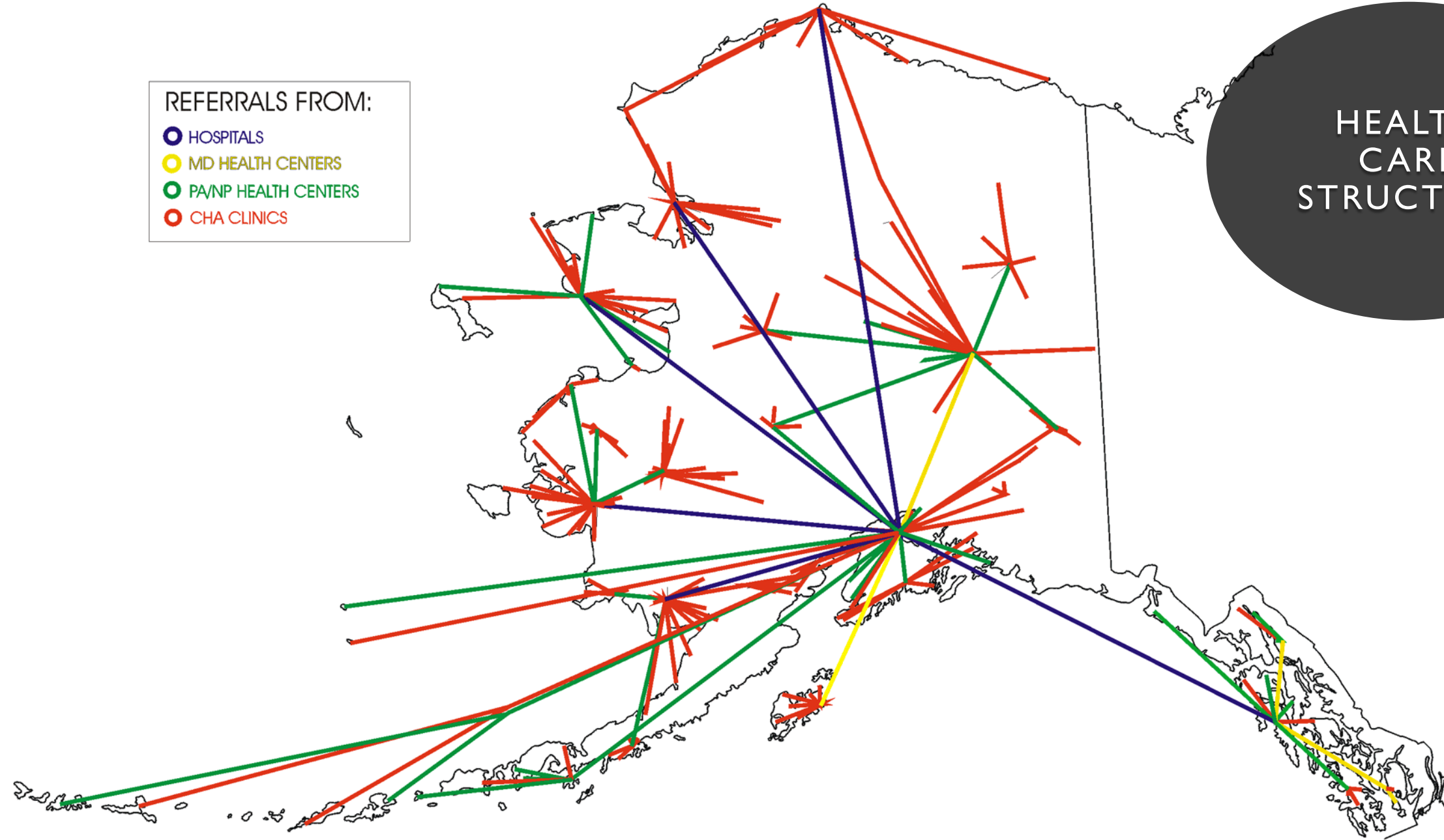
The minimum equipment during the summers months is: food for each occupant for one week; one axe or hatchet; one first aid kit; an assortment of fishing tackle such as hooks, flies, and sinkers; one knife; fire starter; one mosquito headnet for each occupant; and two signaling devices such as colored smoke bombs, pistol shells, etc. sealed in metal containers.

In addition to the above, the following must be carried as minimum equipment from October 15 to April 1 of each year: one pair of snowshoes; one sleeping bag; one wool blanket for each occupant over four.

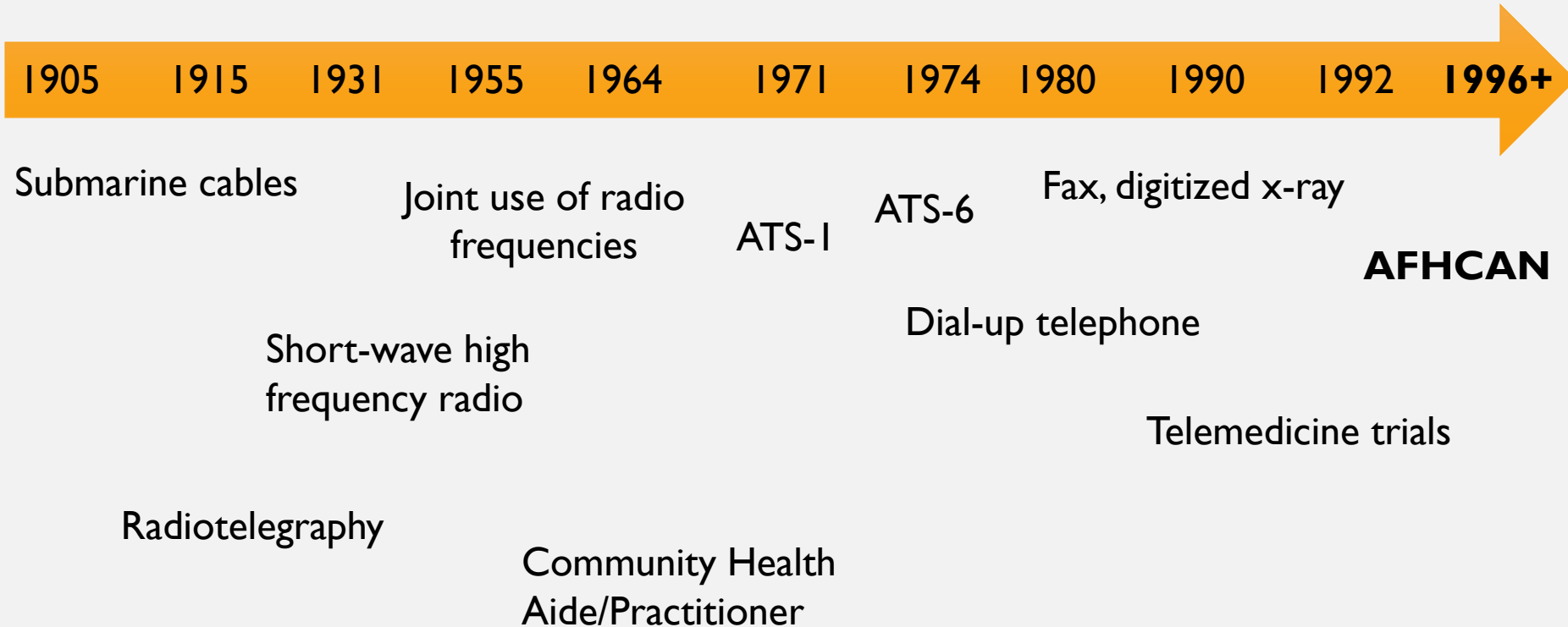
REFERRALS FROM:

- HOSPITALS
- MD HEALTH CENTERS
- PA/NP HEALTH CENTERS
- CHA CLINICS

HEALTH CARE STRUCTURE



# HISTORY OF TELEHEALTH IN ALASKA



# DEVELOPMENT OF AFHCAN

- Alaska Federal Health Care Partnership (AFHCP)
  - VA, DoD, Coast Guard, IHS, ANTHC
- Connects 248 sites (44 organizations)
- Dermatology, Dentistry, Cardiology, Otolaryngology, Audiology, Primary Care, Optometry



ALASKA'S FEDERAL  
HEALTH CARE  
ACCESS NETWORK  
(AFHCAN)



AFHCAN, is a program of the  
Alaska Native Tribal Health  
Consortium (ANTHC)



Provide information  
technology consultation,  
training and support



AFHCAN

<http://afhcan.org/about.aspx>

# AFHCAN CART

- Equipment
  - Video otoscope
  - Tympanometer/audiometer/OAE
  - Dental Camera
  - Vitals/EKG
  - Digital Camera
  - Scanner
  - Camera and speaker
  - Stethoscope



## What do you want to do today?

Create a New Case

Click here if you want to create a new case.

Cases To Review

Click here to view cases on your plate (cases on hold, your cases, your group cases.)

Cases You Sent

Click here to view cases you have sent that are still open (not yet archived.)

Search Archives

Click here to search the archived cases.

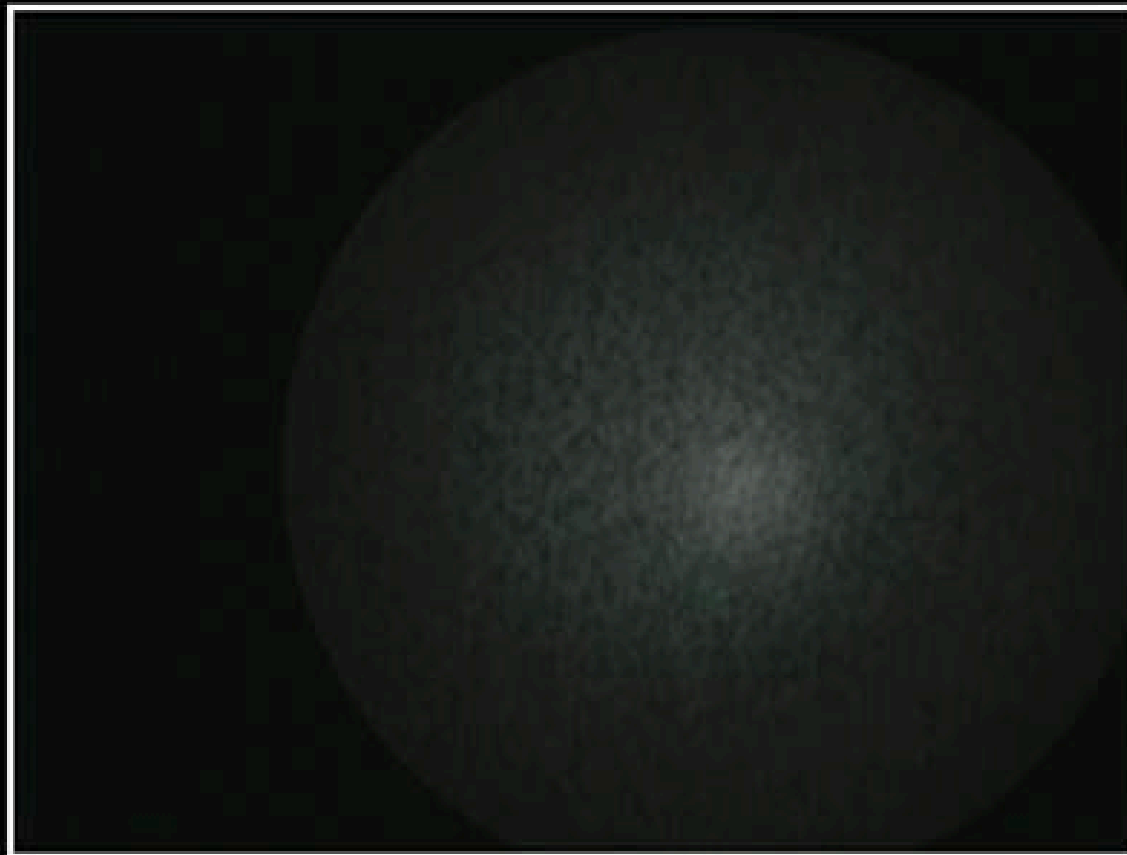
My Settings

All Open  
Cases

Log Out

Video Picture

Thumbnails



Take  
Picture

Live

Freeze

Rotate

Save

Back



Log Out

# Tympanometry

TO START ... Press a button on the Earscan.  
Please do a calibration first.



**Earscan**

Acoustic Impedance  
MP Audiometer  
Data Output

IMP

← Start "Normal" Tympanogram

AUD

CAL

← Start "Calibration" Tympanogram

SPEC

← Start "Fast" Tympanogram

Recommended for young children

Save

Back

Log Out

Case | | | 1 / 1 | 71.2% | | Comment | Share

Comments

Tympanogram  
in  
CALIBRATION  
N 10:54:28  
AM

Tympanogram  
m 10:55:42  
AM

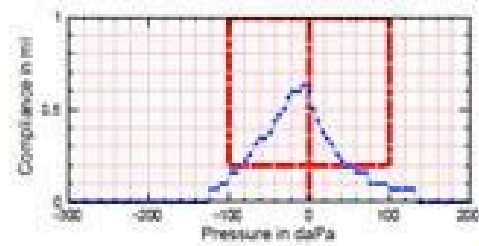
Tympanogram  
m 10:55:42  
AM

Patient: Joe, Doe  
DOB: 10/15/1967 Age: 43 Gender: M  
Test Date & Time: 8/31/2011 10:56:04

AFHCAM tConsult  
Case Number: Test-R-25  
Label: Tympanogram 10:56:04 AM

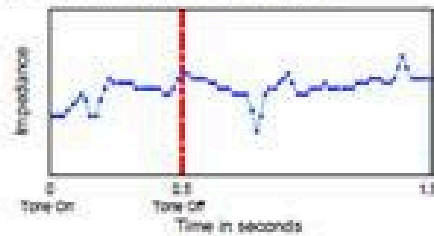
### Tympanogram - Normal Speed

Pressure (of middle ear) -6 daPa  
Gradient (pressure width) 96 daPa  
Compliance (of TM) 0.6 ml  
Volume (of ear canal) 1.3 ml

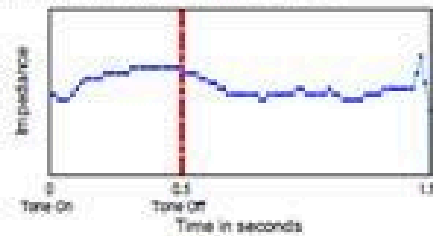


### Acoustic Reflex Test - Ipsilateral

Tone presented at 1000 Hz and 105 dB



Tone presented at 2000 Hz and 105 dB



The graphs displayed are not intended for diagnostic purposes. They are provided for reference only.

Instrument Serial Number: 33201 EPROM Revision: EX71A Calibration Date: 05/2006

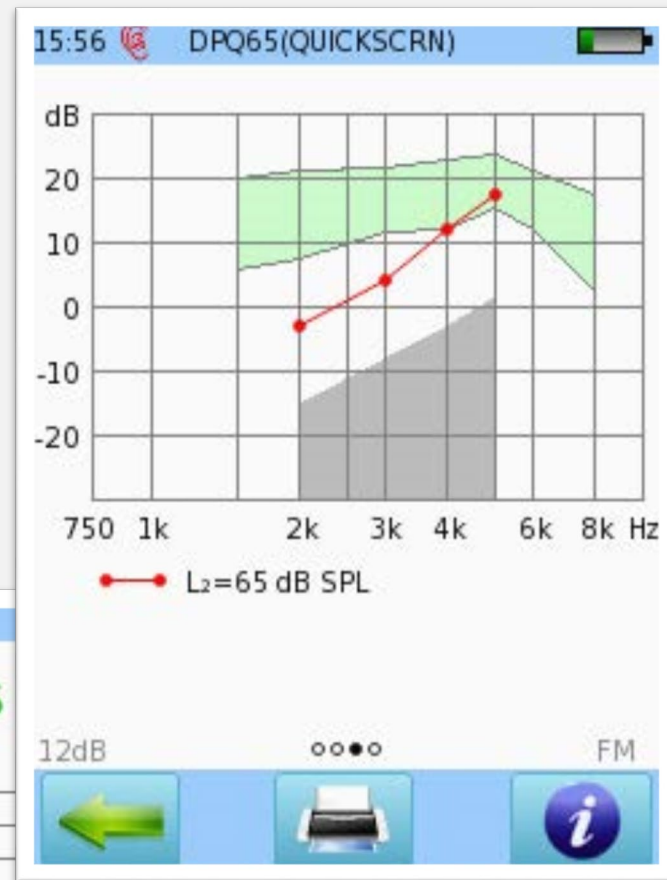
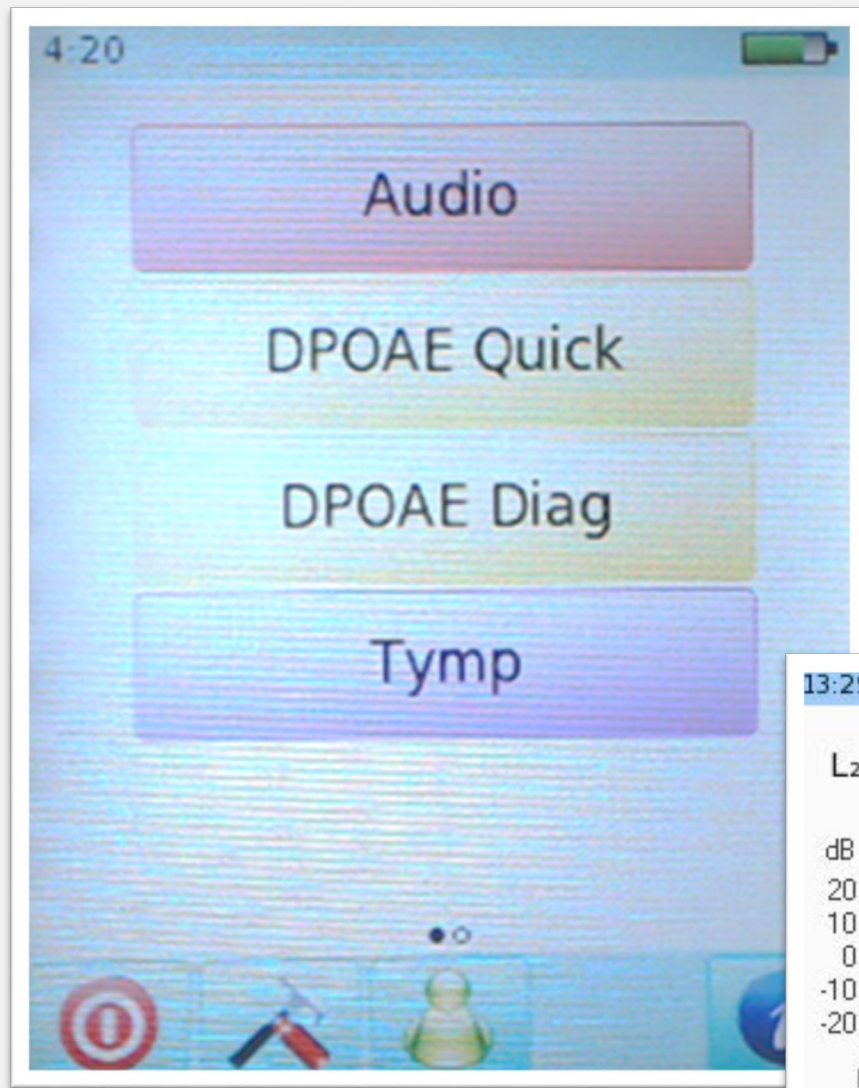
Add To Case

Add Comment

Print

Mark As Sensitive

Done



**Create Case**

- Inbox (1)
  - On Hold (1)
  - Sent to Me
  - Audiology
  - Sent Cases
  - Created Cases
  - Case History
  - Search Cases
- Patients
- Providers
- Groups

**Favorites**  
Edit Favorites

**Administration**

- All Open Cases (2534)
- Our Open Cases (2448)
  - > 3 days (2418)
  - > 30 days (2069)
- Cases On Alert
- Cases with inactive owners (39)



**Inbox (1 Cases)**

List cases by: Case Number

sort: Creation Date

testernie, test (F)	10/09/2014
NSHC NOME-A-4615	
On Hold: Samantha Kleindienst AuD	

No Cases



Smartphone screen content:  
Med Notes (1)  
Thomas, Lisa (F)  
DOB 8/8/1968  
Mary Smith PA (Creator)  
Mary Smith PA (Owner)  
View Activity



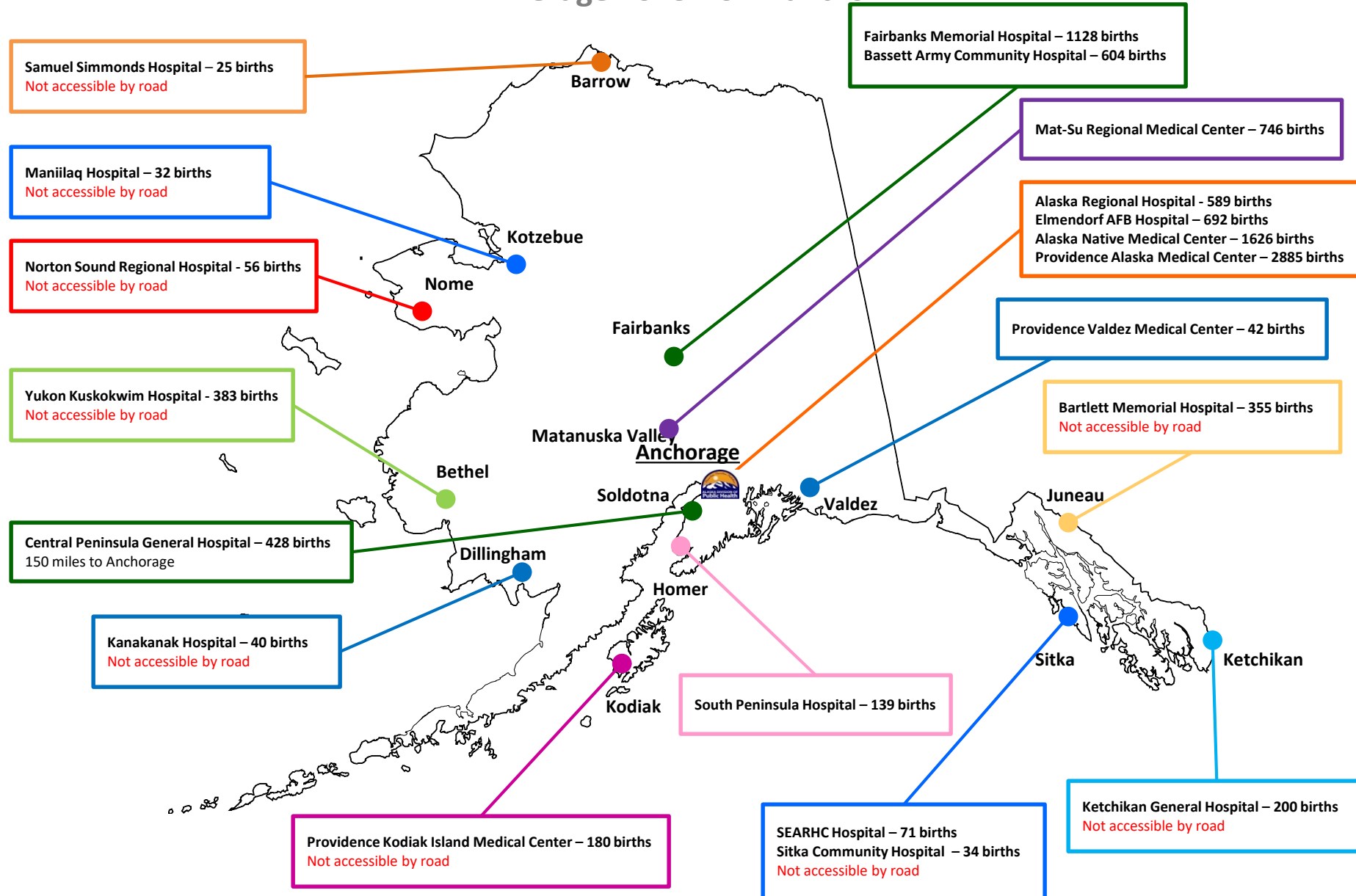
# COMMUNITY HEALTH AIDE PROGRAM

- The Community Health Aide Program (CHAP) consists of a network of approximately 550 Community Health Aides/Practitioners (CHA/Ps) in over 170 rural Alaska villages. CHA/Ps work within the guidelines of the *Alaska Community Health Aide/Practitioner Manual* in assessing and referring members of their communities who seek medical care and consultation. Alaska CHA/Ps are the frontline of healthcare in their communities.
- Three training centers:
  - Anchorage, Norton Sound, Yukon-Kuskokwim

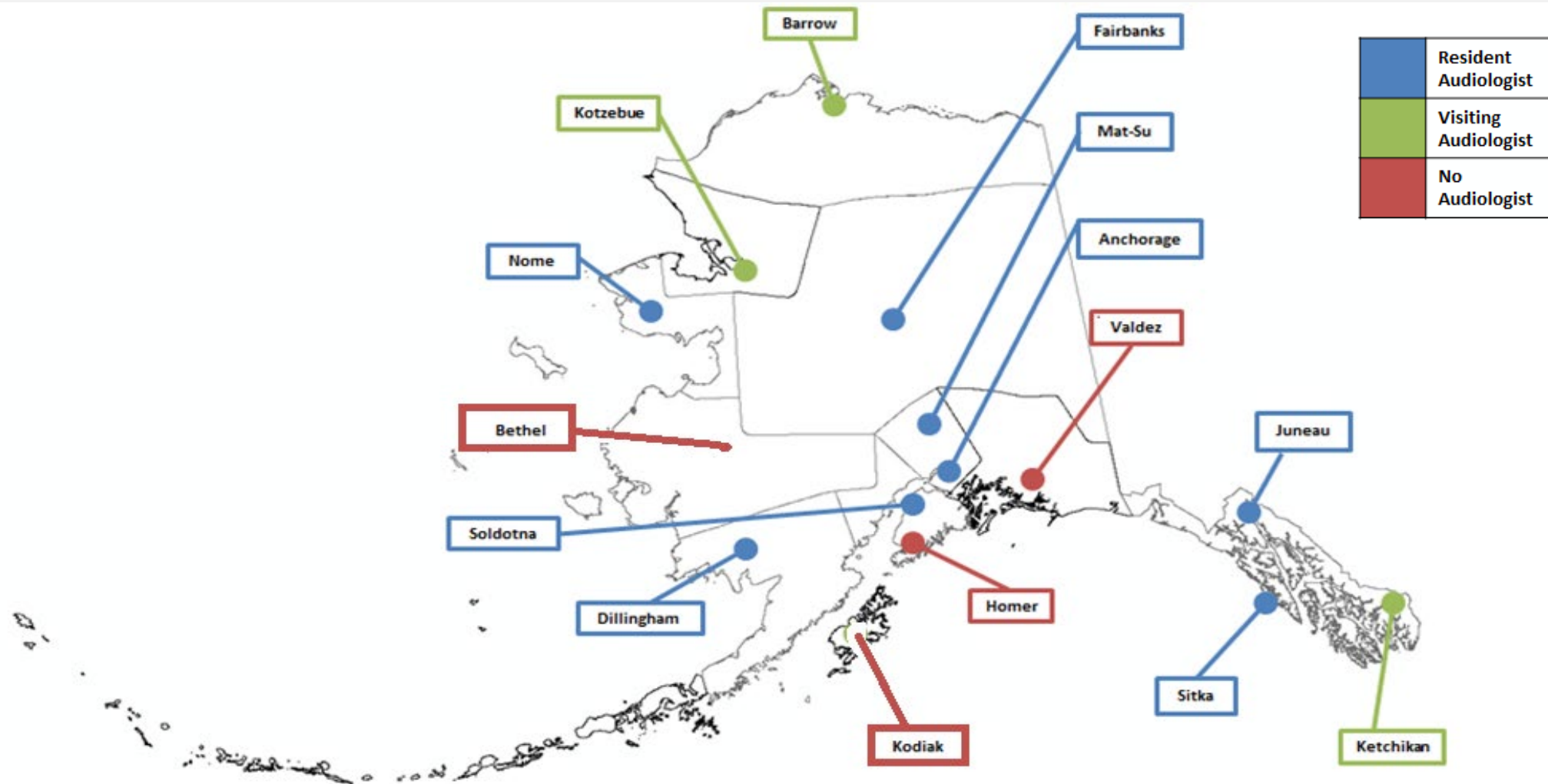


# Locations of Newborn Hearing Screening Hospitals

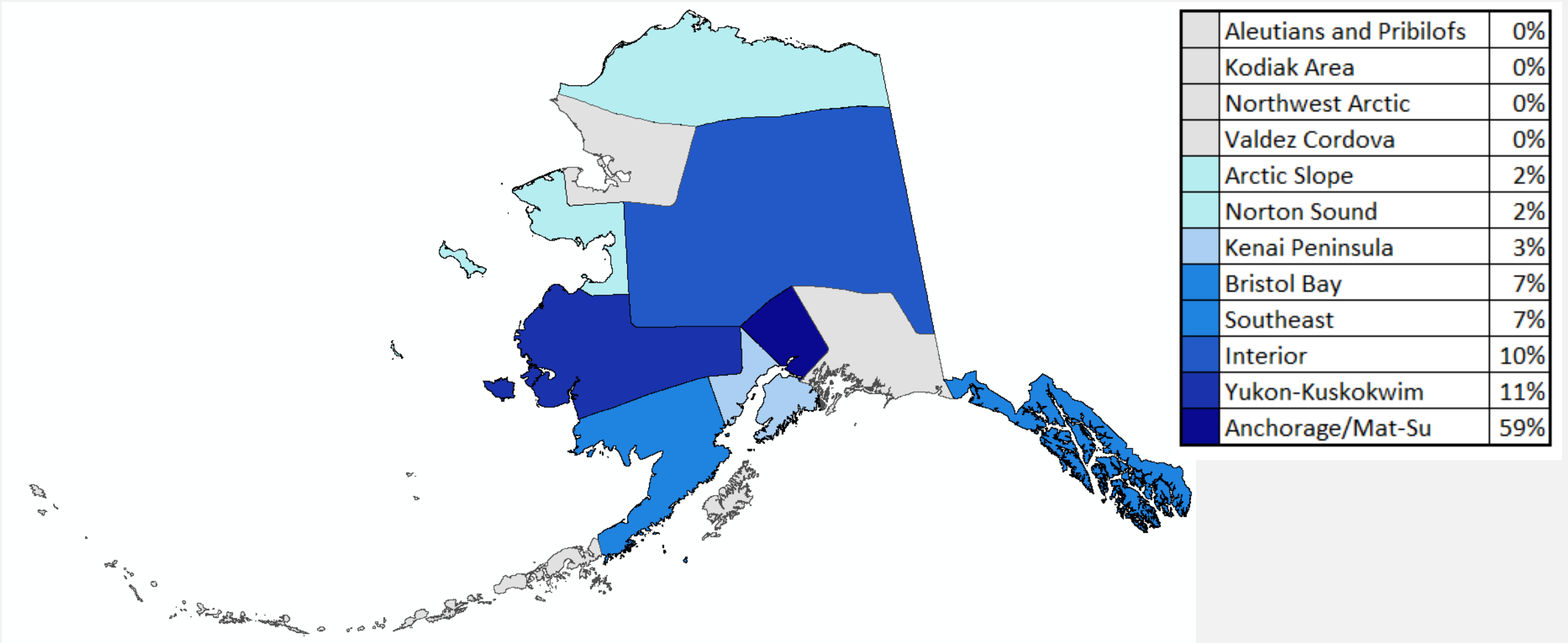
Average 2013-2017 births



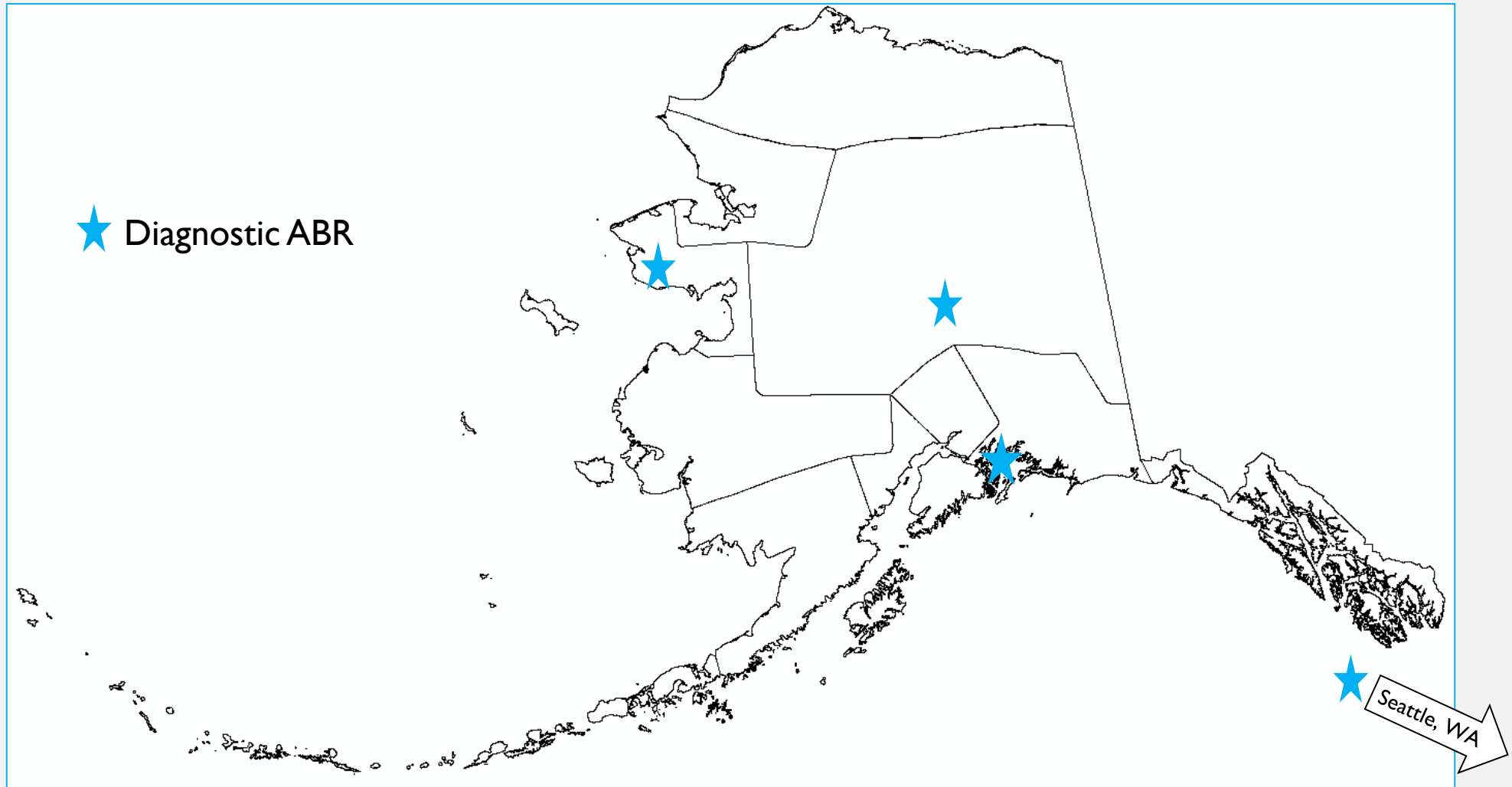
# PEDIATRIC AUDIOLOGICAL AVAILABILITY IN COMMUNITIES WITH BIRTHING FACILITIES, 2017



# DIAGNOSED, REPORTED, HEARING LOSS IN CHILDREN STATEWIDE BY PLACE OF RESIDENCE BY TRIBAL HEALTH REGION, 2013-2015



# AUDIOLOGY DIAGNOSTIC AUDITORY BRAINSTEM RESPONSE (ABR) AVAILABILITY 2017





# TRANSPORTATION TO PEDIATRIC AUDIOLOGY DIAGNOSTIC CENTER





**GOAL: INCREASE PERCENTAGE OF CHILDREN DIAGNOSED  
BEFORE THREE MONTHS OF AGE**

									Includes cases of normal hearing and hearing loss			
Birth year	total births	Total Screened	Total Not Pass	No Hearing Loss	No Hearing Loss Diagnosed Before 3 Months of Age	Hearing Loss	Hearing Loss Diagnosed Before 3 Months of Age	Prevalence per 1,000 Screened	Total Diagnosed	Total Diagnosed Before 3 Months of Age	Diagnosed Before 3 Months of Age among the Diagnosed	Diagnosed Before 3 Months of Age among those Not Passing the Screen
2013	11,278	10,969	148	36	20	20	16	1.8	56	36	64.3%	37.8%
2014	11,256	10,860	126	51	42	19	10	1.7	70	52	74.3%	41.3%
2015	11,175	10,771	142	70	47	19	12	1.8	89	59	66.3%	41.5%
2016	11,110	10,699	135	61	35	19	15	1.8	80	50	62.5%	37%



Program Evaluation



Learning Community



Quality improvement work group

INITIATIVES



LEARNING  
COMMUNITIES  
FOCUS AREAS

- Increase awareness that “children who are deaf or hard of hearing face a potential developmental emergency and should be identified as quickly as possible so that appropriate intervention services can be started.” (AAP)
- Require that parents receive full information about JCIH recommendations
- Provide families of children at risk or newly diagnosed with parent support
- Family support services Family Navigators contact families of children who refer on their final screen for families who do not receive follow up within 90 days of not passing the newborn hearing screening. (based on a clinical trial conducted at the University of Kentucky)

American Academy of Pediatrics (AAP) Early Hearing Detection and Intervention (EHDI) Program

<https://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/PEHDIC/Pages/Early-Hearing-Detection-and-Intervention.aspx>

# EHDI PROGRAM EVALUATION



The first barrier to timely diagnosis was identified as incomplete or late data entry by audiologists.




Program conducted outreach to all audiologists in the state



Statewide audiology training developed



Quick reference guide for reporting electronically developed for Alaska



QUALITY  
IMPROVEMENT  
(QI) TEAM

- Identify barriers by contracting with Alaska's University Center of Excellence (USED), the UAA Center for Human Development (CHD) to survey families with infants who are referred and awaiting a diagnostic assessment as well as infants diagnosed with hearing loss who have not enrolled in EI. All family surveys will be conducted by researchers who are parents of children who are deaf or hard of hearing.
- Teleaudiology pilot project to reach families reluctant to travel

# AK EHDI PILOT PROJECT

Telemedicine use  
active in Alaska's  
native health care  
System



Consulted  
partners in native  
health care system





TELEAUDIOLOGY  
FUNDING

- 2016 EDHI program received \$44,900 supplementary funding from HRSA for teleaudiology
- The funding was directed to expanding the existing tele-audiology practice in Alaska

## GOALS FOR PILOT PROGRAM

**Expand**

Expand an existing successful telehealth project

**Identify**

Identify practices that are successful in serving Alaska's small remote communities

**Identify**

Identify technology sustainable for rural communities averaging 300-800 residents

**Identify**

Identify the infrastructure needed to reproduce the teleaudiology practice

# PLANNING



Is there a clear demand for services?



Realistic appraisal of costs to implement and maintain the system.



Plans to sustain equipment after start-up funding is expended.



Mission, Vision & Values of the partner agency should guide the plan development.

# SITE CHOSEN

- Norton Sound Health Corporation (NSHC) was chosen based on history of successful telehealth practice and infrastructure in place:
  - Motivated leaders
  - Provider buy-in, support, and motivation
  - Training support
  - IT buy-in and support
  - Agency history of commitment to trying novel approaches to address access to care and staff shortage and turnover



## NSHC MISSION, VISION & VALUES

- We will ensure that all patients receive quality and respectful health care.
- We will educate our patients and communities to be proactive in caring for themselves and promoting wellness.
- We will listen to, honor, and respect our elders, preserve their right to speak, and ensure they receive the best care in gratitude for their leadership.
- We will develop state of the art and efficient health care facilities throughout the region.
- We will be financially strong through aggressive, effective and efficient financial management

SITE  
READINESS



Use of innovative  
telemedicine solutions



Resource availability



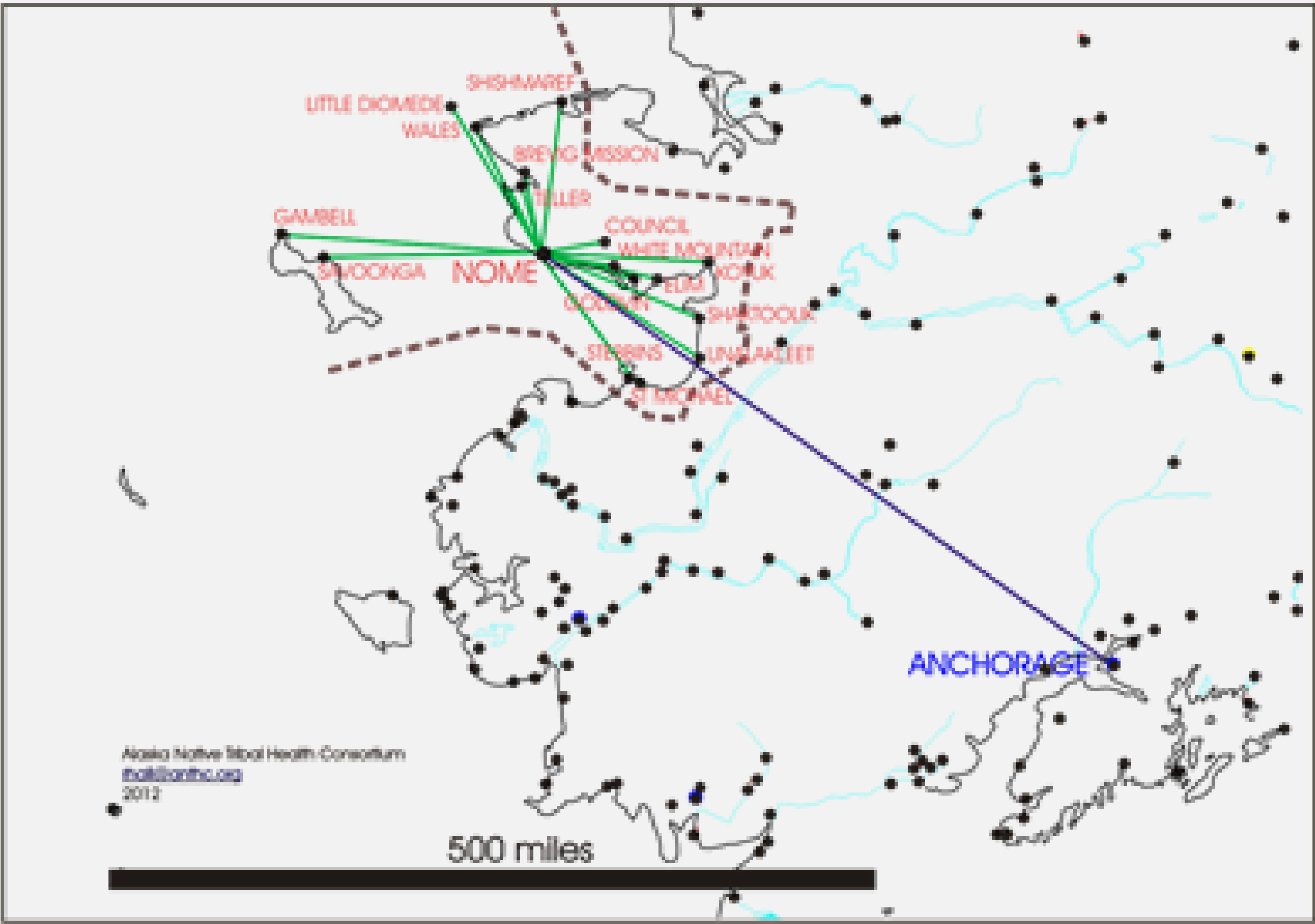
Access to audiology and  
otolaryngology specialties



# NORTON SOUND HEALTH CORPORATION

- Bering Strait Region in Northwest Alaska











## AUDIOLOGICAL SERVICES

- Diagnostics
  - Sound booth (Nome, Unalakleet)
  - Electrophysiological testing
  - Immittance testing
  - Vestibular testing
- Rehabilitation
  - Full digital selection
  - CI/Baha
  - ALDs
  - Verification/Validation

# OTITIS MEDIA IN AI/AN POPULATION

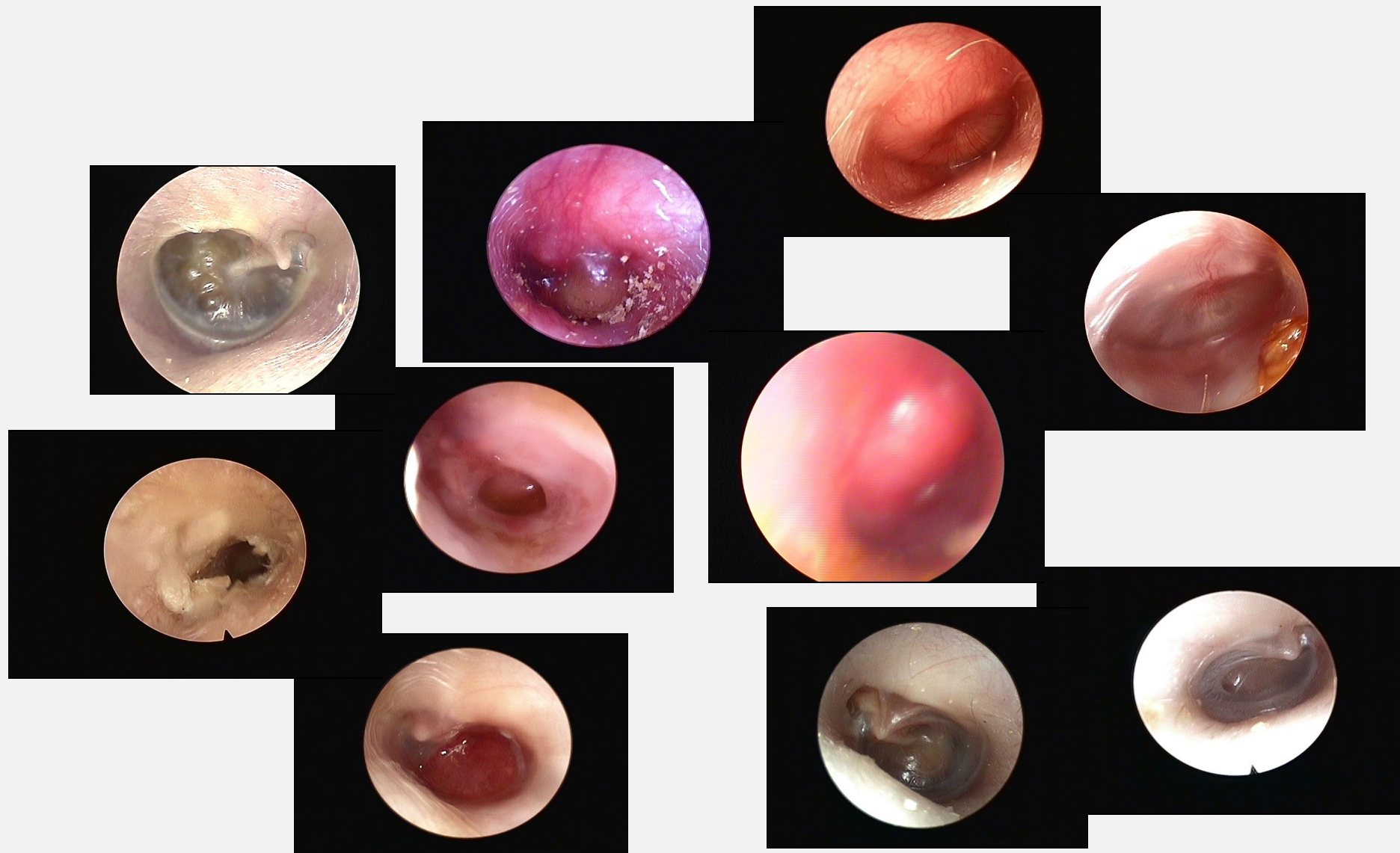
Higher rates of OM compared  
to non-native population

3x higher in children < 1yr  
1.5x higher 1-4yr (Curns et al., 2002)

NSHC (88.7% AN)

OM is one of the top 5 diagnoses for nearly all  
communities

# OTITIS MEDIA IN THE AK NATIVE POPULATION





## TELEHEALTH SERVICES



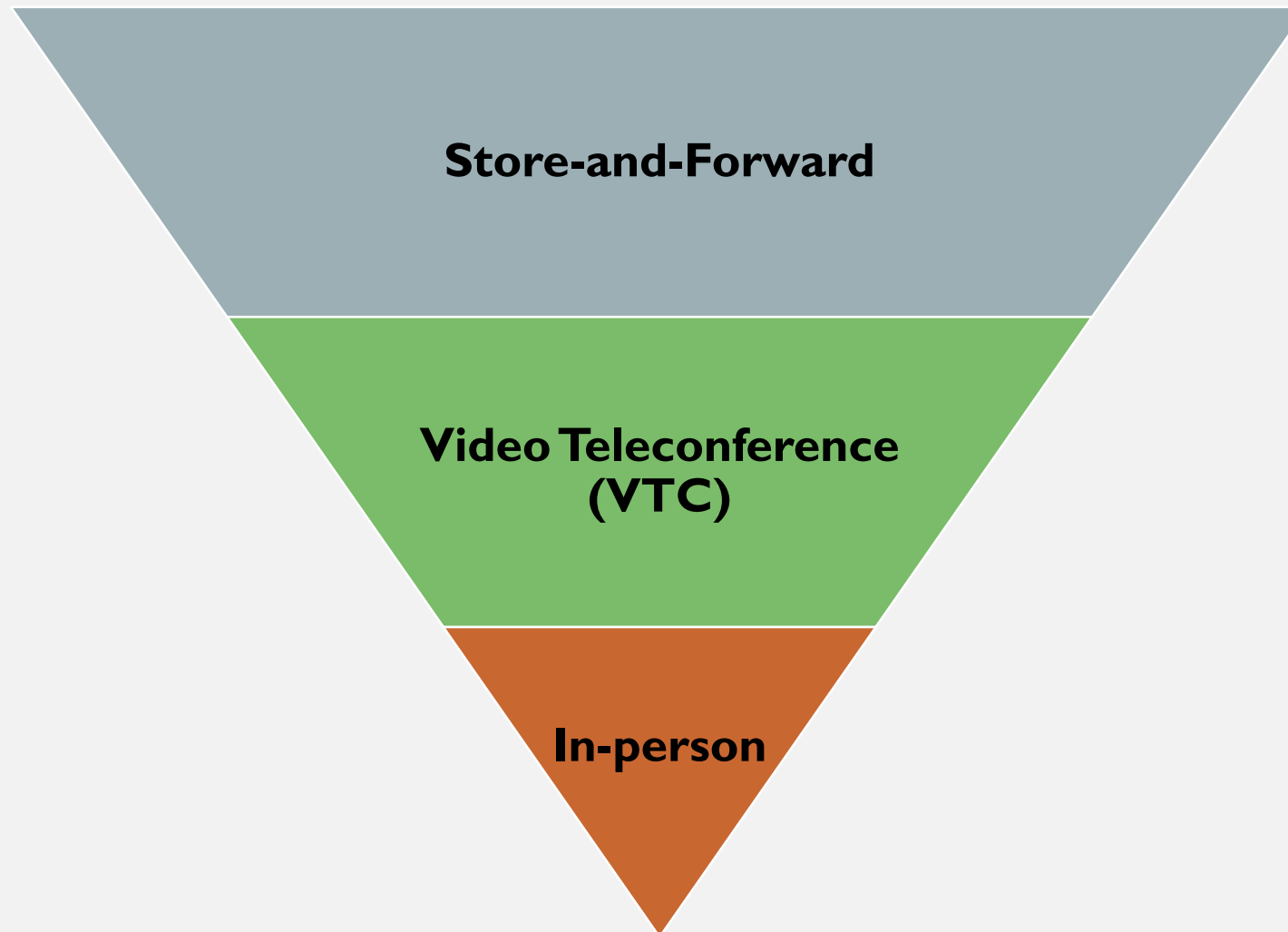
Telehealth Methods: Store and forward, real time (video/remote desktop), hybrid, mobile



Video otoscopy, tympanometry, acoustic reflexes, OAEs, surgical/medical management, hearing aid fitting and programming, troubleshooting, counseling, aural rehabilitation, newborn hearing screening



Not yet tackled: Balance assessment, CI mapping, electrophysiologic testing



NSHC Audiology Workflow for use of telemedicine in audiology and otolaryngology specialty care to increase access and timeliness of care, while reducing travel

A photograph of a medical examination room. In the center, a white diagnostic machine with a monitor and keyboard is visible. To the right, another similar machine is partially visible. On the left, there is a white cabinet with drawers. A white box with a black border is overlaid on the image, containing the text 'ACCESS TO ENT CARE'.

**ACCESS TO ENT CARE**



# OUTCOMES

## 01

Reduced wait-time

- Ferguson et al. (2008)
- Hofstetter, Kokesh, Ferguson, Hood (2010)

## 02

Improved Cost effectiveness, reduced travel

- Kokesh, Ferguson, Patricoski, LeMaster (2009)

## 03

Reduced burden on family and healthcare system



# COLLABORATION

Audiology/ENT

Audiology/Primary Care

Emergency Dept/Specialty Care

Case Management

Ancillary Dept Care Management

Audiology/PT

Audiology/SLP





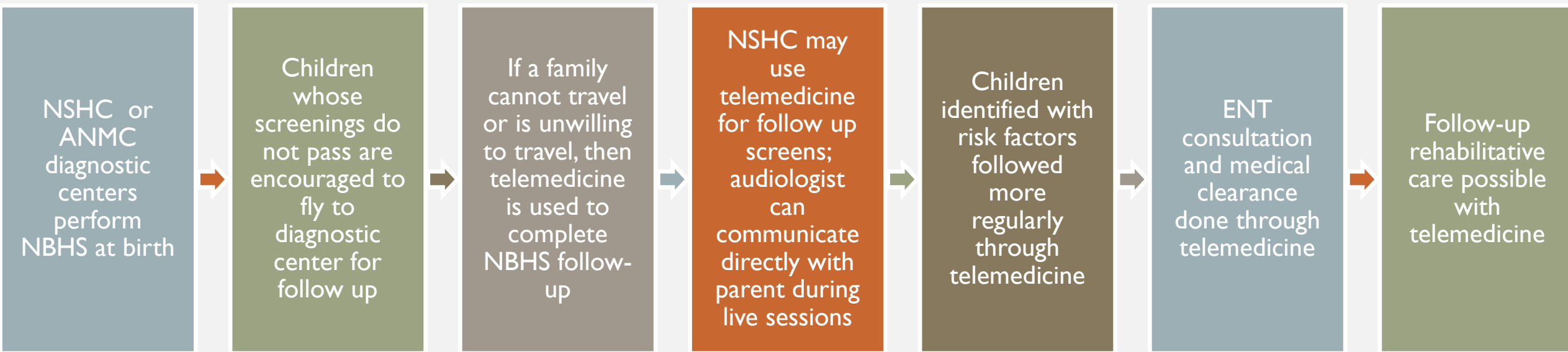
# CASES EXAMPLES

- Cholesteatoma
- Sudden sensorineural hearing loss
- Brain Tumor/Throat Cancer
- Tube/tympanoplasty/mastoidectomy follow-up
- NBHS





# TELEMEDICINE USES



# PILOT PROJECT EQUIPMENT DECISIONS

- The AFHCAN CART contains diverse technology with a small footprint that is portable in the regional health clinic location
- The chosen manufacturer had to be willing to share programming code with AFHCAN IT so the system could be fully integrated in to Cart
- Features: Fully diagnostic, included robust tympanometry and objective hearing assessment
- For the program to be sustainable and reproducible in other regions the equipment costs must be supported by clinics that serve between 200-800 residents.

SENTIERO  
PATH  
MEDICAL



# EQUIPMENT IMPLEMENTATION

- Build into the AFHCAN cart
- Set-up and configured for use
- Installation of hardware
- Preparation of supplies
- Training of staff and instructions on use

Norton Sound Health Corporation

# COMMUNITY POPULATIONS

Location determined by:

- ✓ Need
- ✓ Population size
- ✓ Geographic location
- ✓ Staff resources
- ✓ Successful telemedicine use

COMMUNITY	POPULATION
Nome (regional hub) ★	3598
Brevig Mission ★	388
Elim ★	330
Gambell ★	681
Golovin	156
Koyuk	330
Little Diomede	115
Savoonga ★	671
Shaktoolik ★	260
Shishmaref ★	582
Saint Michael	401
Stebbins ★	556
Teller	229
Unalakleet (Sub Regional)	688
Wales	145
White Mountain	190

## Village Clinics in the Bering Strait Region

Norton Sound Health Corporation (NSHC) is a nonprofit consortium owned by twenty Tribes in the 44,000 square-mile Bering Strait Region of Northwest Alaska, which is home to approximately 9,500 residents; 74.6 percent are Alaska Native.

NSHC operates the Norton Sound Regional Hospital in Nome, as well as clinics in the region's fifteen Native villages, which range in size from 150 to 900 residents. Each Village Clinic is staffed by local residents trained as Community Health Aides. In addition, NSHC stations a Physician Assistant or Nurse Practitioner in larger villages and Dental Health Aides are located in Savoonga, Shishmaref, Stebbins and Unalakleet. Although NSHC operates its own medevac service and telemedicine is available, the vast geographic distances within the service area can present challenges during inclement weather.



(xxx) Air Miles to Nome



## CASE STUDY

- Newborn male
- Born at 36 weeks, no complications with pregnancy/birth
- No family history of hearing loss but 3 older siblings with h/o recurrent ear infections and tubes
- Referred NBHS (AABR) left ear, passed right ear
- 5 weeks- completed VTC appt (otoscopy, tympanometry, OAEs, counseling)
  - Referred DPOAE screening (4 freq) left, passed right
- 7 weeks- completed AABR (In Nome)
  - Referred left, concern for possible effusion (type C tympanogram)
  - Consult with ENT via telemedicine resulted in recommendation for course of amoxicillin
- 8 weeks- completed diagnostic ABR (in Nome)
  - No sign of acute infection but tymps shallow with slight negative pressure
  - ABR normal Wave V right on click @ 20 dB nHL ,ABR NR left @ 90 dB nHL
  - Consult with ENT via telemedicine resulted in scheduled for exam with binocular microscope, genetics, ophthalmology
  - In discussion for amplification



# DREAM VS REALITY



Remote regions = shortage of audiologists and ENT



Balance best practice with clinical need and accessibility

# TIPS AND TAKE AWAYS

# TELEAUDIOLOGY PRACTICE LESSONS

- Staff for project should have a desire to become knowledgeable and skilled with the equipment chosen.
- Teleaudiology is still new and successful usage requires flexible thinking and commitment to work through challenges that arise.
- Troubleshooting and adapting to changing situations is a regular part of remote practice.
- Some professionals are extremely skilled and superb service providers; however, if they value predictability and routine they may not enjoy teleaudiology practice.



MORE  
TELEAUDIOLOGY  
PRACTICE

- In this system of care, the use of the tele-audiology device is only a small part of the remote staff's regular duties. The remote staff may be looking to provider for direction, encouragement and coaching with the system
- When the clinic audiology staff travel to remote sites they provide refresher training to brush up skills
- If an in-person visit to remote site is infrequent make time to communicate one-on-one with the clinic staff outside of the patient visit to consult on what they need to feel proficient and confident with the process

# TRAINING



Consider having a team member(s) become a subject matter expert/Super User



Learn enough yourself to troubleshoot simple issues



Ask IT for a checklist of most common issues or develop a list in house



Frequent team communication



Consider including both informal communication channels and regular check-ins



Share what you learned the hard way with the team - both successes and challenges

# INFRASTRUCTURE



EQUIPMENT



SUPPORT



PERSONNEL/RELATIONSHIPS



# BENEFITS AND CHALLENGES



## Benefits

Earlier identification

Patient-Centered

Access to early Audiology/ENT consult through telemedicine process without travel



## Challenges

Infrastructure

- Start-up costs
- Training- initial, continuing, and new staff
- Maintenance services and costs

Personnel

Best Practice



## PLANS TO EXPAND

- NSHC has plans to expand the PATH equipment upgrades to additional health clinic locations and NSHC HAT program
- Move toward AABR via telemedicine
- The Tribal health care system will evaluate the need and resources to expand to other regions
- Private pediatric audiology practices in the state have indicated they currently do not have plans to expand their practice to include teleaudiology



DEMONSTRATION

# REFERENCES

- Alaska Mapping Business Plan. (2018, September). Retrieved January 10, 2019, from [https://www.commerce.alaska.gov/web/Portals/4/pub/RiskMAP/2018\\_Alaska\\_Mapping\\_Business\\_Plan\\_Appendix\\_FINAL.pdf](https://www.commerce.alaska.gov/web/Portals/4/pub/RiskMAP/2018_Alaska_Mapping_Business_Plan_Appendix_FINAL.pdf) State of Alaska / Commerce / Community & Regional Affairs
- Alaska Department of Transportation and Public Facilities Division of Statewide Aviation, from <http://dot.alaska.gov/stwdav/index.shtml>
- American Academy of Pediatrics (AAP) Early Hearing Detection and Intervention (EHDI) <https://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/PEHDIC/Pages/Early-Hearing-Detection-and-Intervention.aspx>
- Curns, A. T., Holman, R. C., Shay, D. K., Cheek, J. E., Raufman, S. F., Singleton, R. J., & Anderson, L. J. (2002). Outpatient and hospital visits associated with otitis media among American Indian and Alaska Native children younger than 5 years. *Pediatrics*, *109*(3), 1-6. doi: 20.2542/peds.109.3.e41
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- Kokesh, J., Ferguson, A. S., Patricoski, C., & LeMaster, B. (2009). Traveling an audiologist to provide otolaryngology care using store-and-forward telemedicine. *Telemedicine and e-Health*, *15*(8), 758-763.