

ROCKY MOUNTAIN SPOTTED FEVER

Arizona breaks the rules (again)

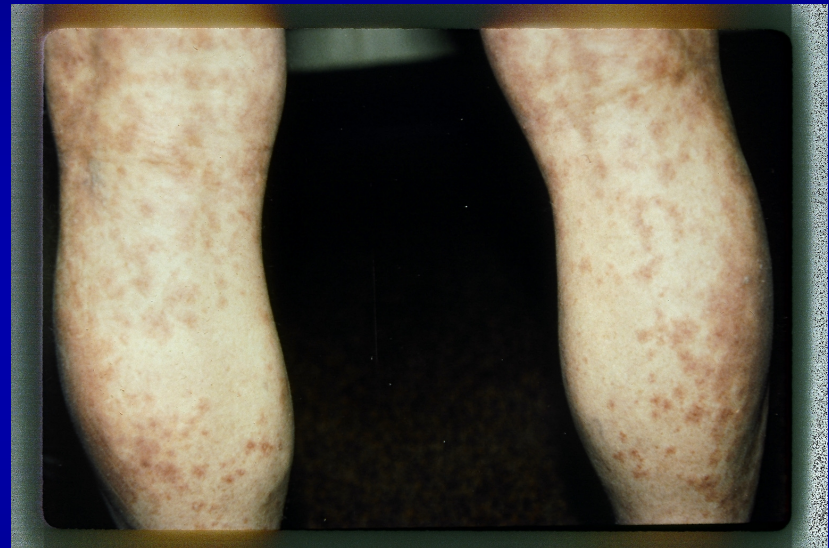


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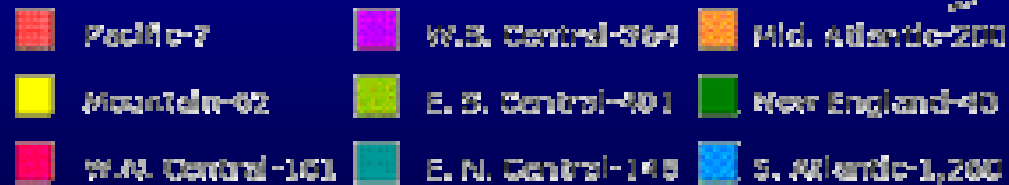
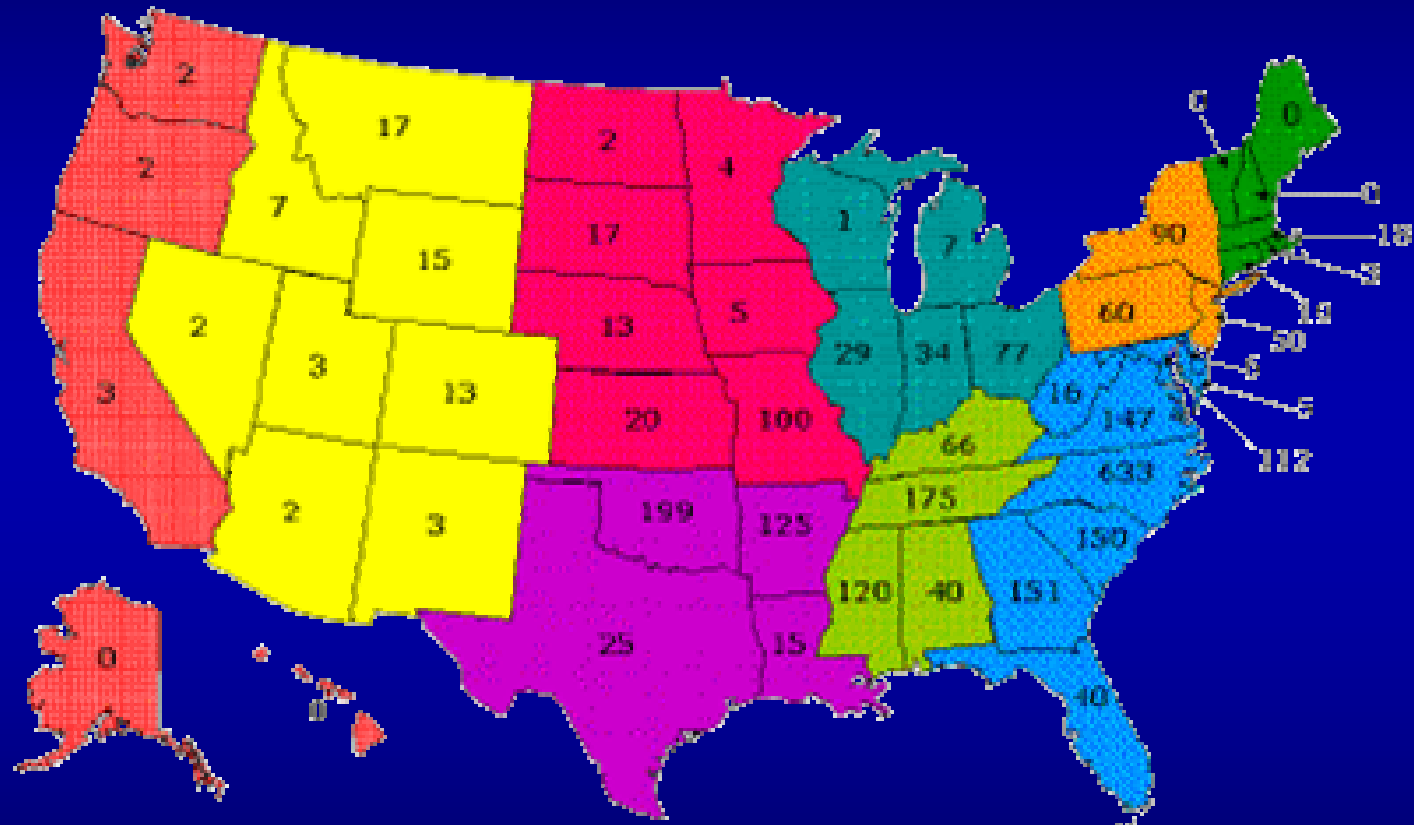


Rocky Mountain Spotted Fever

- ***Rickettsia rickettsii***
- **Most severe tick-borne disease in U.S.**
- **~ 250 – 1,200 cases reported annually**
- **Most cases occur in eastern ½ U.S.**
- **Sporadic in Rocky Mtn west (3-5% cases)**
- **Fatal 20-30%+ cases (un-tx)**



RMSF Cases in U.S.



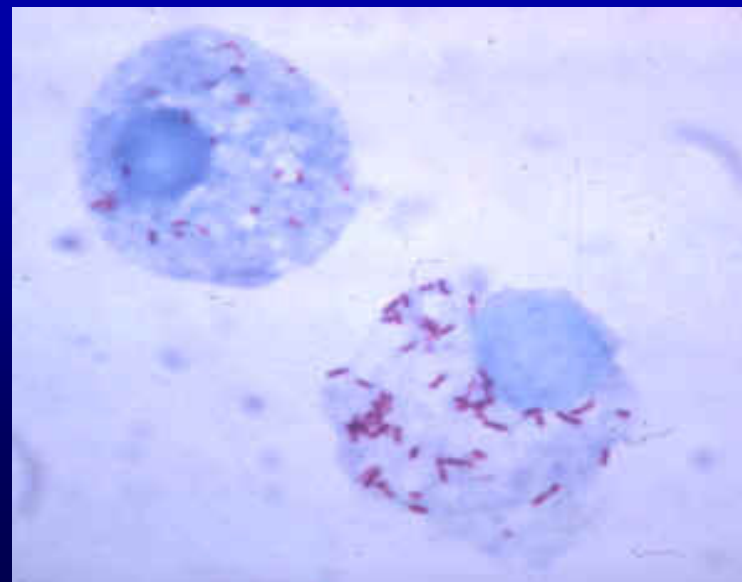
RMSF – U.S. Vectors

- American dog tick
(*Dermacentor variabilis*)
- Rocky Mtn Wood Tick
(*D. andersoni*)
- *Amblyomma* sp?
- Brown Dog Tick
(*Rhipicephalus sanguineus*)



RMSF – Vectors & Reservoirs

- **Ticks = vector & principle reservoir**
- **Transovarial transmission**
- **Transtadial transmission**
- **Misc. mammals play minimal role as reservoirs**



RMSF Symptoms

- Initial Sx

- Sudden Onset
- Fever & chills
- Severe headache
- Nausea & vomiting
- Deep muscle pain
- Anorexia
- Conjunctival injection

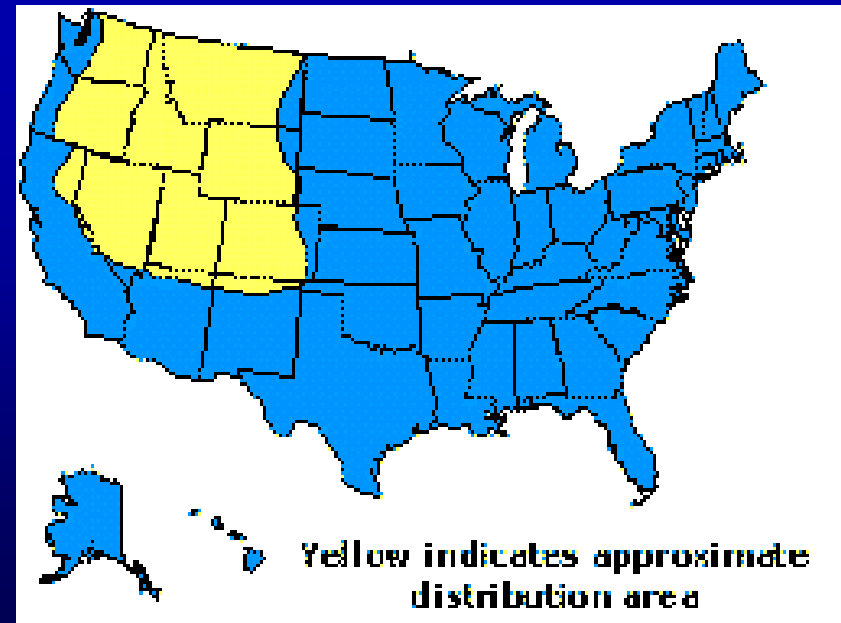
- Later Sx

- Rash
- Abdominal pain
- Arthalgias
- Diarrhea



RMSF in Arizona's Past

- Rocky Mtn wood ticks (*D. andersoni*) = uncommon in AZ
- Prior to 2000, RMSF cases were rare
- Ave 2 cases/decade
- Most cases had outside travel/exp
- Two cases reported w/ no outside travel

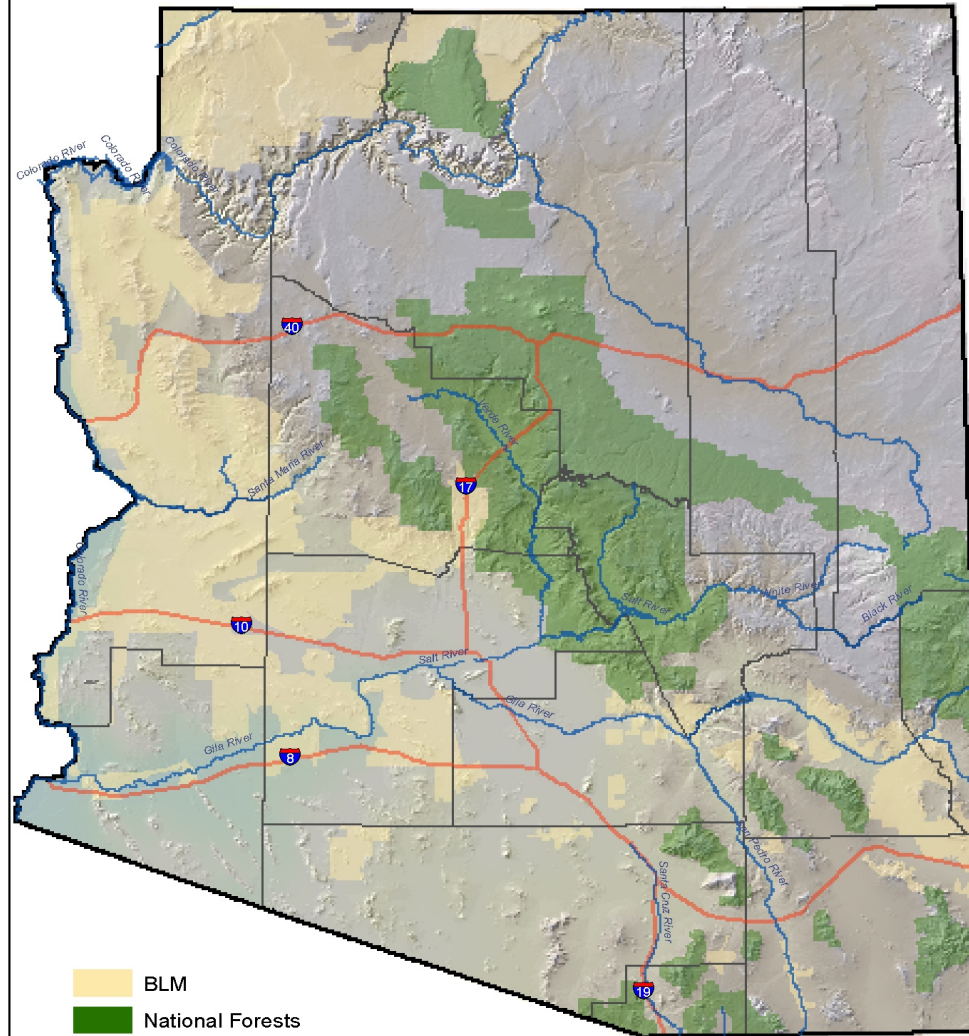


RMSF Index Case – Aug. 2003

- 14 month old child RMSF case / fatal
- Rural community in the White Mountains Region – eastern AZ
- Population ~ 1500
- CDC EIS reviews med. recs. & identifies additional case in 2002 – same comm.



ARIZONA



0 50 100
Kilometers

Arizona Department of Health Services
Office of Infectious Diseases Services
Sources: ESRI Shapefiles
ALRIS Shapefiles
April 2005



Arizona
Department of
Health Services

RMSF: White Mountains

- Elev. 5,000-7,000 ft.
- Pinyon-Juniper & Grassland
- Dry climate
- Population of Community A = 1500
- Total population of Res A = 20,000+



RMSF Response: CDC & IHS

- CDC-EIS Officer:
Case investigation
- Chart reviews –
retrospective case ID
(prob. case – 2002)
- Medical inservices @
regional hospitals
- Prevention education:
fliers & tick kits for
local residents

Protect Yourself and Your Pets!!

ROCKY MOUNTAIN SPOTTED FEVER

A potentially fatal tick-borne disease



Tick Checks . Save Lives

Look for ticks **daily** on head, body, and clothes of **children, adults, and dogs!**

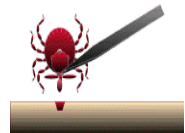
- Be especially alert after outdoor activities during peak tick season, April – September!!
- Contact a doctor if you develop illness (fever, headache, rash) after exposure to a tick!



Tick Removal . Saves Lives

Remove ticks promptly:

- Use tweezers or protect bare hands with tissue or gloves, and grasp the tick close to the skin
- Pull straight up gently until all parts of the tick are removed from the site
- Wash the bite well with soap and water



Tick Prevention . Saves Lives

When working or playing in areas with ticks:

- Use repellent containing DEET
- Wear light-colored clothes so arms and legs are covered

Use tick medications or shampoos on local dogs!!

Cut back shrubs and remove unused furniture and garbage from around the home!!



Tick Surveys

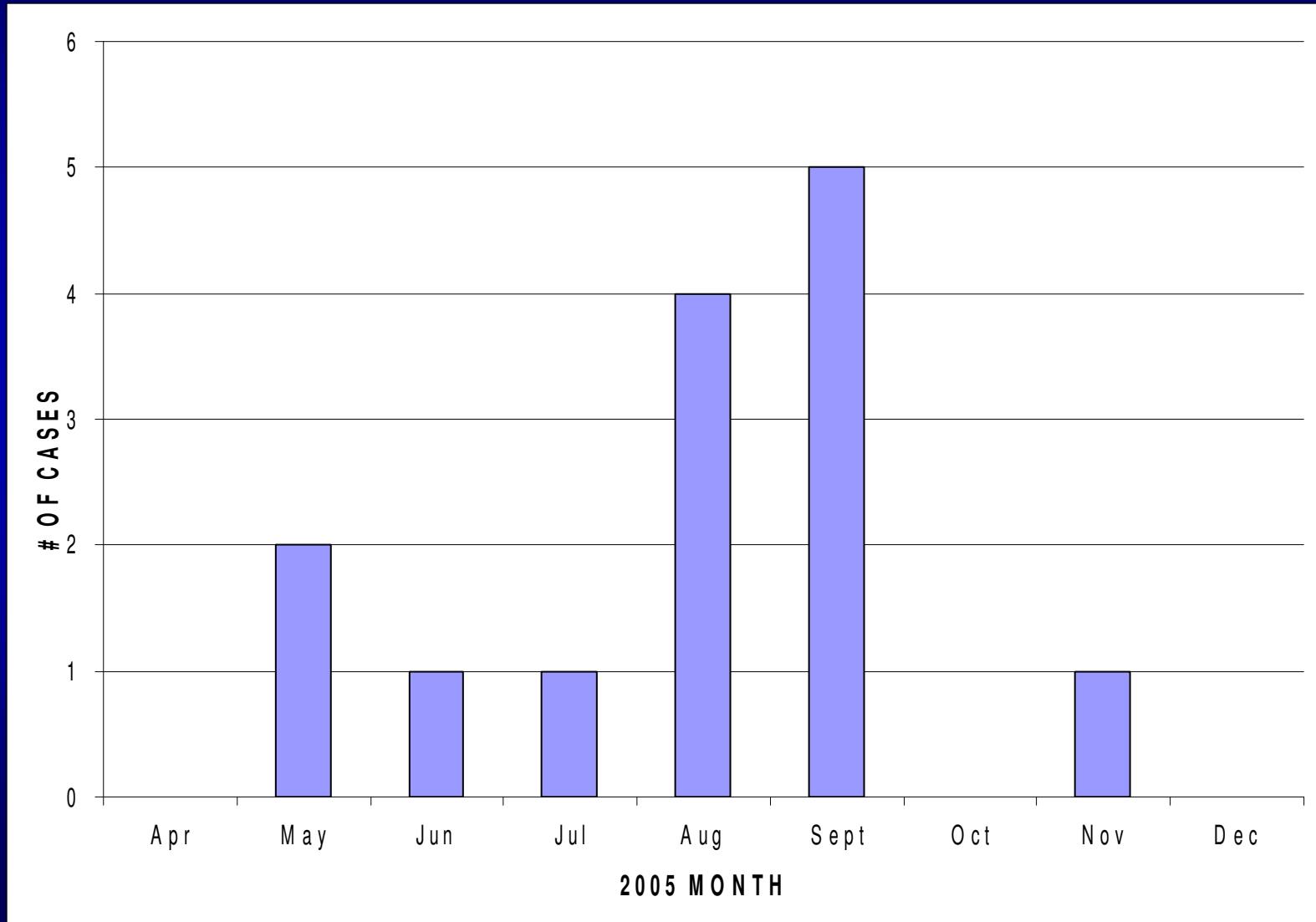
- Tick drags & small mammal trapping in April 2004 at case houses & nearby habitats did **not** reveal *Dermacentor* ticks
- Brown dog ticks were plentiful on dogs, around homes, etc.



RMSF Outbreak - 2004

- 14 cases: Res. A – 13, Res. B – 1 ?
- Most cases occurred in two communities approximately 50 miles apart – Res. A*
- Most testing performed by CDC - IHC, PCR, and serology.
- Confirmed – 9, Probable --5
- Most (80%) cases were children < 12 yrs
- Age range: < 1 year – 67 years
- Male – 8, Female - 6
- One case was fatal

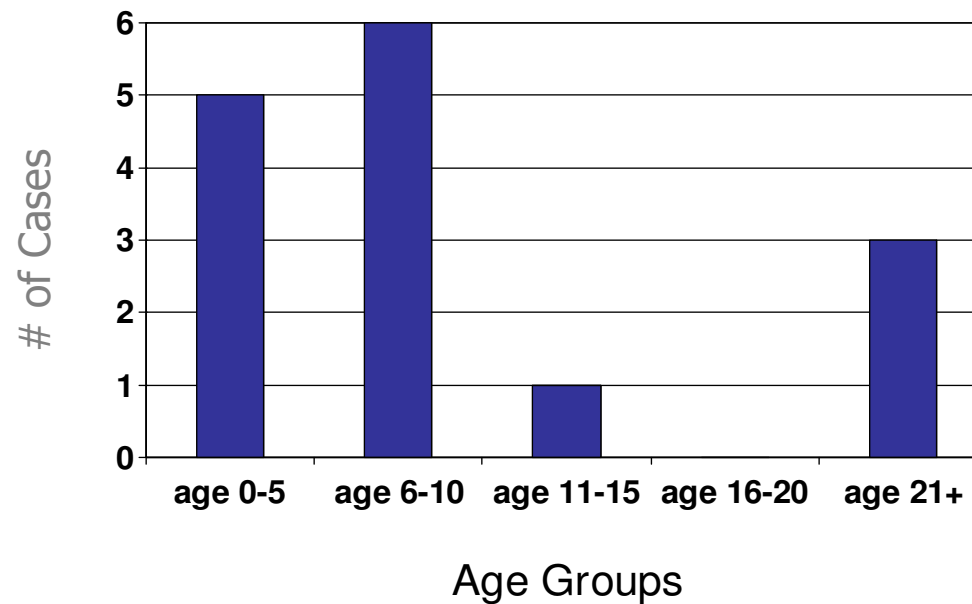
RMSF 2004 Epi-Curve



RMSF: White Mountains Region

RMSF Cases by Age

American Indian Reservation, Eastern Arizona, 2002-2004
(including confirmed and probable cases)



RMSF: Clinical Dilemma

Rickettsia rickettsii infections do not always resemble “classic” RMSF

Delayed diagnosis = delayed treatment =

↑ possibility for fatal outcome

Rash may appear late, or not at all **

Sx strongly suggest other etiology

(ex. pharyngitis / strep throat, ARDS, etc.)

Serologic testing - IgM & IgG Ab may not be detected until 7+ days after onset

Rx decisions must be made on clinical picture

Clinical Dilemmas – Part 2

- Local hospitals prescribed lots of doxycycline for unexplained fever and rash
- True size of RMSF outbreak = unknown
- Acute specimens were usually negative
- Suspect case patients were often lost to follow-up (conv. sera - were not obtained for many suspect cases)

RMSF Outbreak Response 2004

- Cont. F/U new cases
- Cont. collecting ticks on dogs & around homes
- Collect dog sera
- Cont. education (IHS & Tribal CHRs)



CDC evidence for a new tick vector

- ***Rhipicephalus sanguineus* Studies**

- > 700 adult ticks collected
 - all were brown dog ticks
 - large #s on dogs
 - large #s near case homes & other homes
- > 5,000 nymphs & larvae
- tick analysis
 - ticks were tested at CDC lab
 - brown dog tick carried *Rickettsia rickettsii*
 - up to 10% of ticks infected



CDC evidence for a new tick vector

- May 2004: *Rhipicephalus sanguineus* ticks found attached and engorged on a 10 y.o. patient were PCR/RFLP positive for *Rickettsia rickettsii*.
- 10 y.o. patient - confirmed to have RMSF
- *Rh. sanguineus* ticks found on pet dog and around the case home were:
 - PCR/RFLP positive for *R. rickettsii*
 - Culture positive for *R. rickettsii*

CDC data: Canine Serosurvey

Community	Total # dogs	Total # Serum	Total seropositive	% seropositive
1	15	14	7	50
2	6	3	1	33
3	1	1	1	100
4	10	7	4	57
5	4	3	2	67
6	5	3	3	100
<u>7</u>	9	8	8	<u>100</u>
<u>8</u>	21	16	16	<u>100</u>
9	11	9	4	44
10	5	4	3	75
11	11	8	2	25
12	1	1	1	100
13	6	5	2	40
<u>14</u>	12	9	3	<u>33</u>
15	3	3	2	67
16	9	8	3	38
17	4	4	4	100
Totals	133	106	66	62

Canine Serosurveys Past & Present

CDC data: Evidence for Recent Emergence

% dog bloods sero+ for <i>R. rickettsii</i>	1996	2003 & 2004
RESERVATION A	5 %	70 %
RESERVATION B	NA	57 %

Why is RMSF rising? What has changed?

- Stray dogs = long term problem
- Tick numbers have increased noticeably the last few years (IHS-OEH obs.)
- Dog numbers may have decreased due to disease



New RMSF Vector?

- Past laboratory studies have shown *Rhipicephalus sanguineus* ticks are capable of transmitting *Rickettsia rickettsii*.
- *R. sanguineus* ticks are host specific. Preferred host = dogs.
- Parasitism on humans = very low under most circumstances.
- Extreme circumstances → unexpected events.

RMSF Outbreak: the crux of the problem

- Severe stray dog problem
- Lack of pest control (on pets & property)
- Extreme brown dog tick problem
- Close association of dogs and kids
- Ample tick habitats – outdoor upholstered furniture, mattresses, elevated homes without skirting, stucco walls, tall grass/weeds, etc. Home site habitats are more tick friendly (↑ moisture, shade, etc.)



RMSF Response: 2004-2005

- SHORT TERM
- Education for residents & clinicians
- Tick control on dogs
- Pest control around homes
- Community clean-up
- LONG TERM
- Animal control program
- Sustained pest control
- Structural changes to homes - skirting



RMSF Response Team - 2005

- CDC
- IHS
- Tribes
- ADHS
- ORKIN®
- WATSONIANS
- USDA
- Army – Ft. Huachuca



Prevention Education

- **CDC-EIS – medical inservices @ regional hospitals**
- **IHS-OEH – radio PSA public meetings, etc.**
- **IHS & Tribe – adm. fliers & survey door-to-door**
- **CDC & Tribe designed fliers & calendars for kids**



Protect Your Family From **Rocky Mountain Spotted Fever!**



Get Rid of Ticks on People

When you are outside or touching dogs you might get a tick. After you come inside check your body and your child's body for ticks and take them off.



Get Rid of Ticks in Your Yard

Ticks live in the things you leave outside such as old mattresses. Don't give ticks a home. Take trash and old mattresses from your yard to the landfill. Some yards may also need treatment with a chemical that kills ticks.

Contact a Doctor or Nurse

Rocky Mountain spotted fever is a disease that is spread by ticks. A person who has Rocky Mountain spotted fever would have a fever and sometimes a rash.

Call your doctor or public health nurse if you or your child:

- **Get a fever or rash**

AND

- **Have been outside or touching dogs**

For more information on Rocky Mountain spotted fever:
San Carlos Health Department: (928) 475-2798
Indian Health Services- Office of Environmental Health: (928) 475-7213



Community Clean-Up Campaign

- **IHS-OEH**
- **Tribal Housing Authority**
- **CDC Volunteers**
“Watsonian Society”
- **May 2005 - over 1,000 truck loads of solid waste were hauled to the local landfill**



Pest Control - 2005

- Orkin® staff treated 350+ homes in outbreak community in April 2005
- Orkin® donated equipment & chemical to treat 700± homes
- Pest control cont. by Tribal Housing Authority, IHS-OEH & local company

- 1,100+ homes treated



Tick Control for Dogs

- USDA, Army, CDC, IHS & ADHS
- Zodiac® tick collars – (propoxur – 3 month residual) were placed on 1,000's of dogs (est. 70%+ coverage)
- Also, spot-on treatments & sprays



Not all dogs were approachable



RMSF Response: ADHS' Contribution

- Gov. approves \$50,000 Health Crisis Fund
- Provided 14,000 fliers & 2,500 educational calendars / coloring books for kids
- Provided 4,000 dog tick collars, etc.
- Provided 360 bags of permethrin granules
- 20± staff days – on site assistance (tick-trapping, dog collaring, etc.)



Outcome – Year End, 2005

- GOOD NEWS
- 69% ↓ # RMSF cases - Reservation A
- 2004: 13 cases | 2005 – 4 cases (1 fatal)
- BAD NEWS
- ↑ # RMSF cases – Reservation B
- 2004: 1 case ? | 2005 - 9 cases (1 fatal)
- ADHS diverts resources to Res. B
- It's not over yet! There is still much to do.

RMSF Response: 2006 & Beyond

- Expanded RMSF surveillance - ADHS
- Sustained clinical vigilance – IHS, ADHS, regional health care providers
- Sustained pest control programs - Tribes
- Sustained tick control on dogs - Tribes
- Animal control program dvp - Tribes
- Local RMSF program coordinator - Tribes

Expanded RMSF Surveillance

- Canine Serosurvey
- ADHS & CDC
- 14 participating animal ctl agencies
- Collect blood & ticks from dogs in northern & eastern AZ
- Study in progress



Future Questions

- How widespread is RMSF in Arizona?
- Do female brown dog ticks pass the rickettsia transovarially?
- What role (if any) do dogs play as *Rickettsia rickettsii* reservoirs?
- Are *Rhipicephalus sanguineus* ticks vectoring RMSF in other states?

Future Concerns

Prevention programs must be developed and sustained at a local level!

- Tick control on pets
- Pest control for home sites
- Animal control officer / program

Home use pesticides and dog tick collars have short term residual.

Brown dog tick populations, and *Rickettsia* infection in ticks can rise very rapidly if unabated.

Acknowledgements

- CDC
- IHS
- Tribes
- ORKIN®
- WATSONIANS
- USDA
- Ft. Huachuca
- ADHS

