Virus del Oeste del Nilo (VON):

Situación y perspectiva para México y Latinoamérica

West Nile Virus (WNV):

Present and future for México and Latinoamerica

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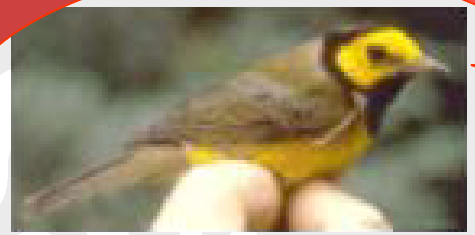
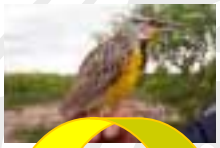
National Program of Diseases Transmitted by Vectors
Secretariat of Health

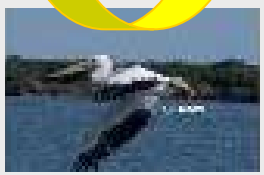
Natural cycle of transmssion and disemination WNV



Migratory birds

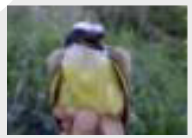


Wild cyccle



Bridge vectors

New patterns of disemination **??**



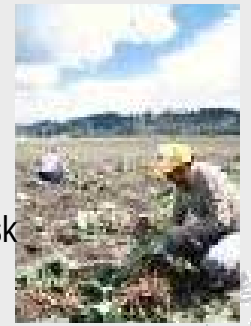
Domestic birds

Domestic animals

Transfussion
Transplant
Transplacental
Accidental in Labs
Eat dead animals
????

Urban environment

Major risk groups



Rural environment

WNV in Latinamerican countries, 2002-2003:

- Mexico
- Dominicana
- El Salvador
- Jamaica
- Bahamas (?)

PAHO

After New York outbreak in 1999

- **In Mexico:**
  - **National epidemiological alert.**
  - **Comitte for National Surveillance Human Health, Natural Environment and Animal Health Sectors.**
- **PAHO alert to all Members States.**

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In Mexico 2000 :

- **Secretariat of Health stablished a special Surveillance Program.**

- **Health Animal surveillance included WNV in his specific activities of Equine Neuropaty (Animal Pathology Center).**

In Mexico 2001:

- Universities Autonomous of Yucatan and Nuevo Leon States started diagnosis activities in colaboration with COSU.

- First suspected evidence of infected bird in Yucatan.

In Mexico 2002:

- Reinforcement of laboratory diagnostic technics (Canada).
- One imported suspected human dead of severe neurological disease (from Houston, Tx).
- Two seropositives birds in Yucatan.
- 20 equines seropositives (Tamaulipas, Coahuila and Yucatan).

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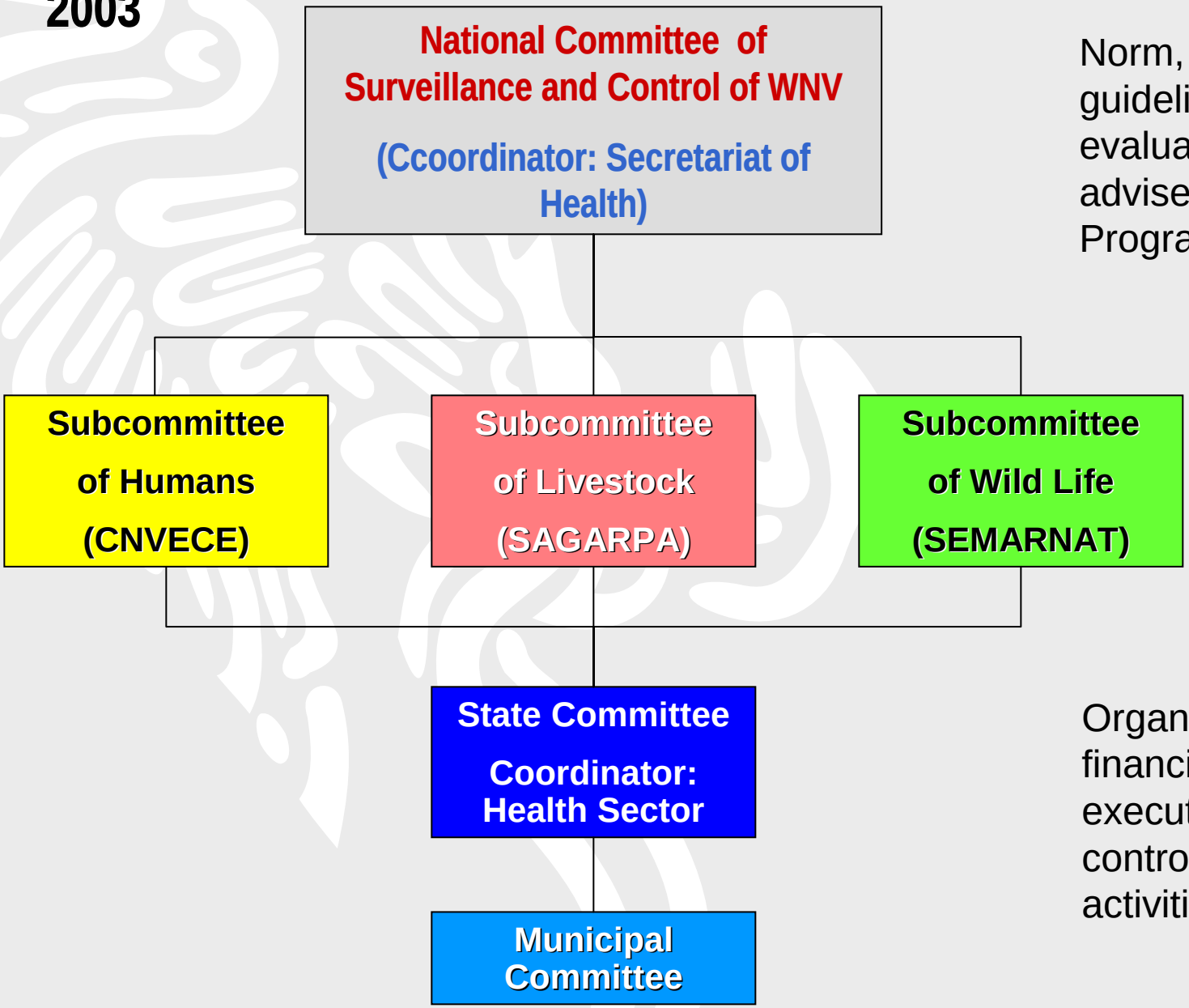
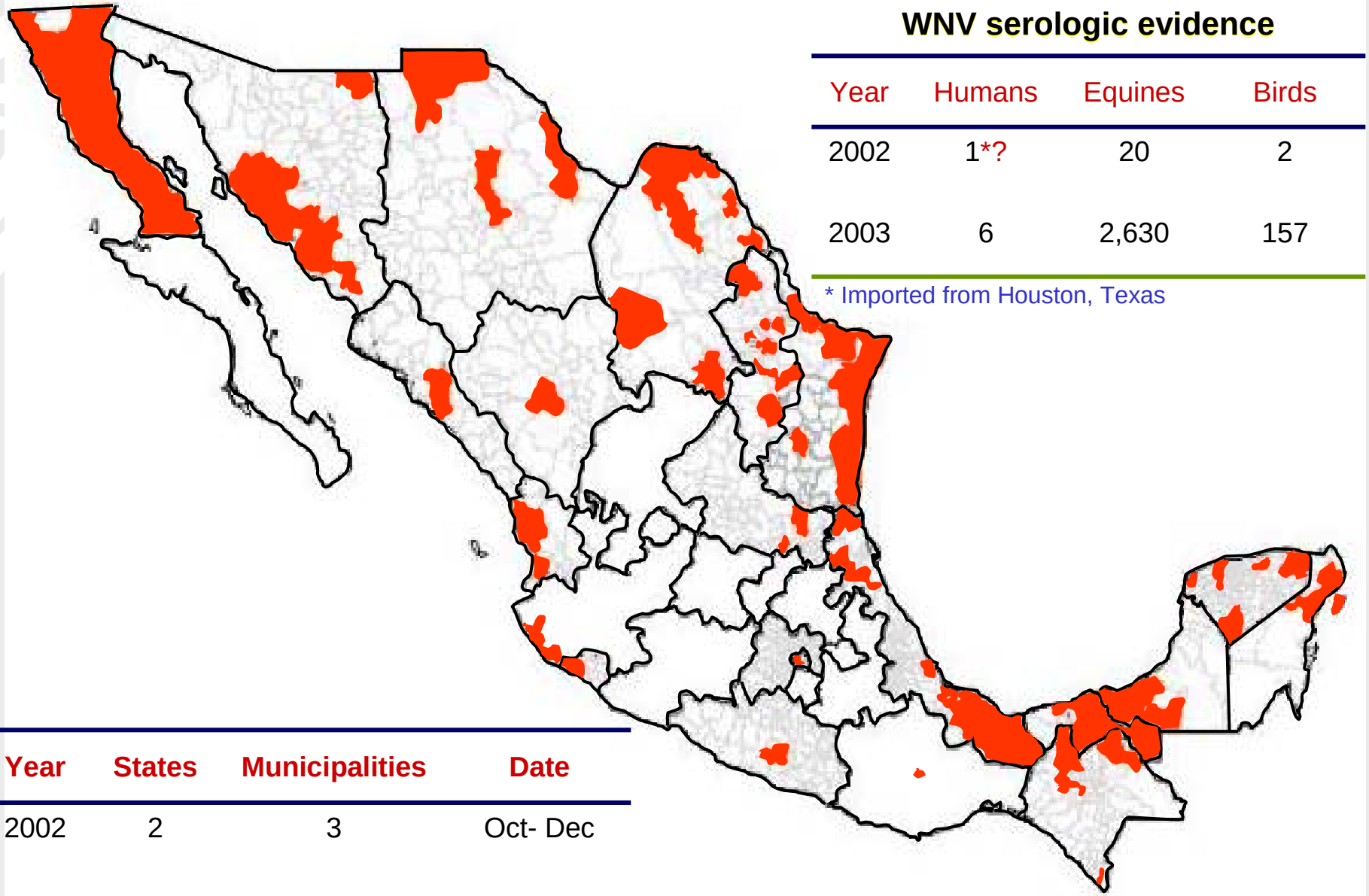
2003



Norm, stablish guideliness, train, evaluate, and advise to State Programs

Organize, financing, executing, and control the activities

WNV distribution in Mexico, 2002 - 2003



WNV serologic evidence

Year	Humans	Equines	Birds
2002	1*?	20	2
2003	6	2,630	157

* Imported from Houston, Texas

Year	States	Municipalities	Date
2002	2	3	Oct- Dec
2003	24	122	Jan-Dec

Migratory routes from North American birds

In Mexico 2002-2003:

WNV Identification (RT-PCR)

Año	Humans	Equines	Birds
2002	0	0	0
2003	1	2	10

Virus identification (RT-PCR) 2003

05-12-03 Mexicali

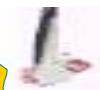
27-11-03 Hermosillo

27-10-03 Cajeme

13-07-03 Juárez

27-08-03 Cerralvo

13-11-03 Aldama



28-11-03 Altamira

6-05-03
Yumka

16-01-04
Centro?
Centla?

Surveillance in Human cases, 2003

604 probable human cases of WNV:

6 cases:

3 West Nile fever

3 Neurological sever illness

Diferencial diagnosis

EEE 15 cases,

EEV 9 cases

SLE 3 cases

WNV by groups in humans

Age	Prob. Cases	Confirmed cases
0	**27**	0
1 a 4	**58**	0
5 a 14	**111**	0
15 a 24	**59**	1
25 a 44	**88**	3
45 a 64	**57**	2
65 and more	**28**	0

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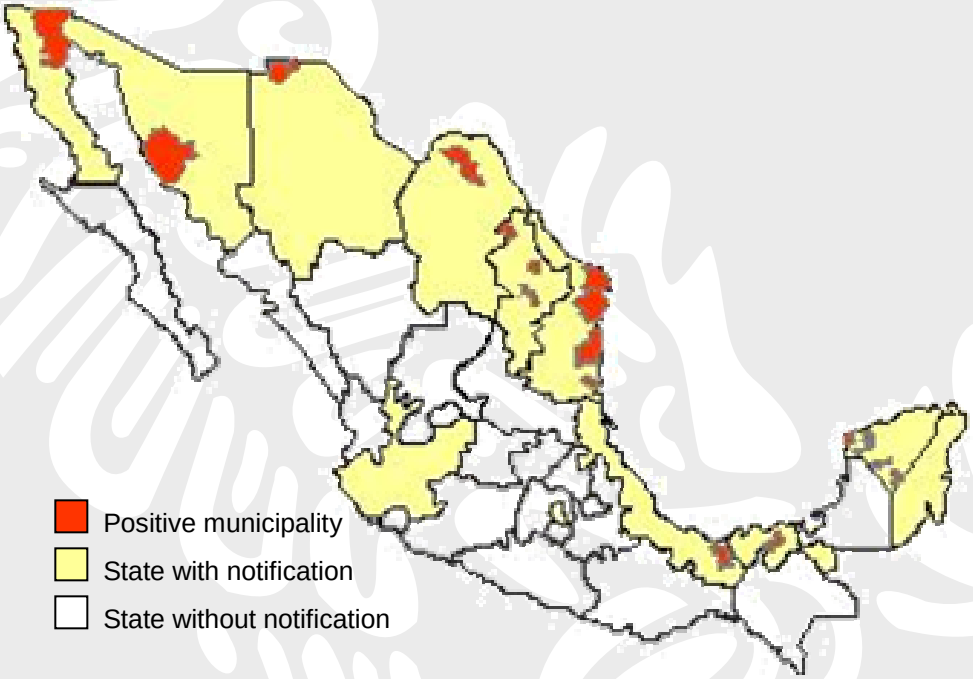
Surveillance in birds, 2003



18,099 samples

3 cases (dead)

7 RT-PCR

147 Seropositives

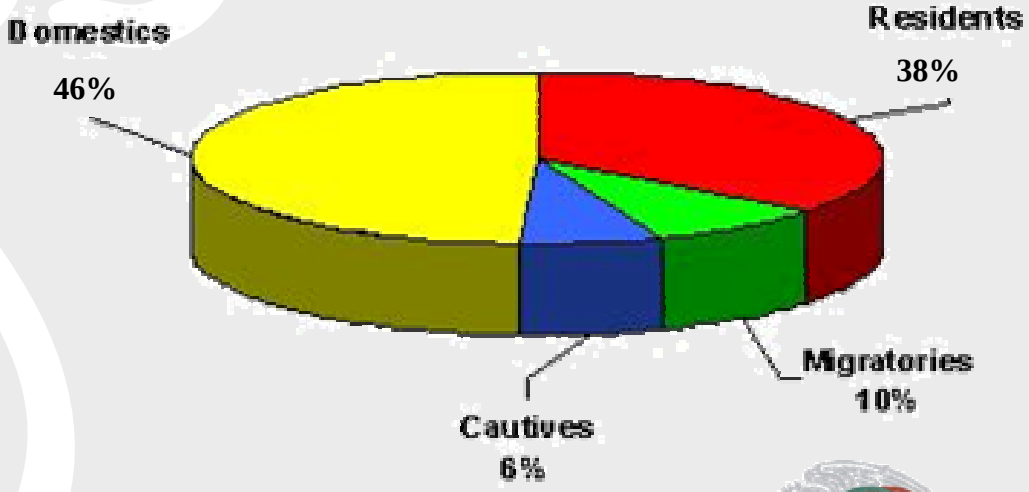
490 samples studied in dead birds (5%).

3 RT-PCR were in dead birds.

7 RT-PCR were in healthy birds that were killed.

All of seropositives samples were in healthy birds.

WNV Infection for type of birds



Identification of infected birds, 2003

Taxonomy	Comun name	RT-PCR
Quiscalus mexicanus	Great-tailed Grackle	2
Pelecanus erythrorhynchos	American White Pelican *	1
Phalacrocorax auritus	Double-crested Cormorant	1
Fulica americana	American Coot	1
Egretta caerulea	Little Blue Heron	1
Corvus cryptoleucus	Chihuahuan Raven *	1
Corvus corax	Common Raven *	1
Columba livia	Rock Dove	1
Butorides virescens	Green Heron	1

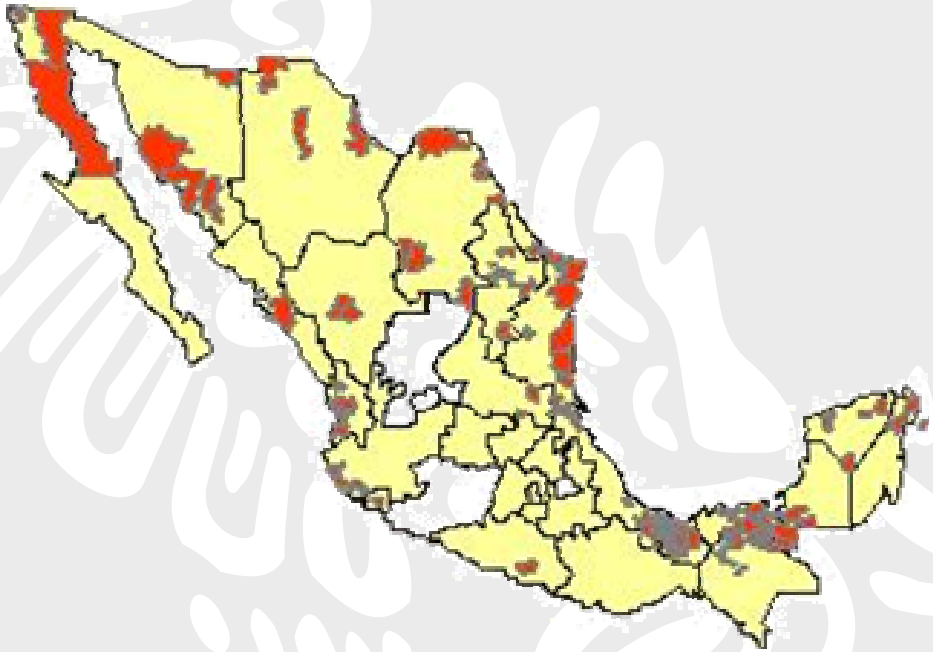
* Dead

Identification of infected birds, 2003

Taxonomy	Comun name	Serology
Gallus gallus	Red Junglefowl	52
Meleagris gallopavo	Wild Turkey	25
Anas sp.	White Duck	8
Columbina passerina	Common Ground-Dove	5
Myiarchus tyrannulus	Brown-crested Flycatcher	4
Turdus grayi	Clay-colored Robin	4
erythrorhynchos	American White Pelican	3
Mimus gilvus	Tropical Mockingbird	3
Passer domesticus	House Sparrow	3
Zenaida macroura	Mourning Dove	2
Melanerpes aurifrons	Golden-fronted Woodpecker	2
Sayornis phoebe	Eastern Phoebe	2
Toxostoma longirostre	Long-billed Thrasher	2
Cardinalis cardinalis	Northern Cardinal	2
Cardinalis sinuatus	Pyrrhuloxia	2
Dives dives	Melodious Blackbird	2
Icterus cucullatus	Hooded Oriole	2
Phasianus colchicus	Ring-necked Pheasant	1
Pavo cristatus	Common Peafowl	1
Micrathene withney	Elf Owl	1
Melanerpes pygmaeus	Red-vented Woodpecker	1
Falco sparverius	American Kestrel	1
Dendrocygna autumnalis	Black-bellied Whistling-Duck	1
Chrysolophus pictus	Goleen Pheasant	1
Chen caerulescens	Snow Goose	1
Coragyps atratus	Black Vulture	1

Taxonomy	Comun name	Serology
Caracara cheriway	Crested Caracara	1
Buteo jamaicensis	Red-tailed Hawk	1
Bubo virginianus	Great Horned Owl	1
Ardea herodias	Great Blue Heron	1
Aratinga nana	Olive-throated Parakeet	1
Ara militaris	Military Macaw	1
Empidonax minimus	Least Flycatcher	1
Pitangus sulphuratus	Great Kiskadee	1
Tyrannus melancholicus	Tropical Kingbird	1
Vireo pallens	Mangrove Vireo	1
Baelophus bicolor	Tufted Titmouse	1
Troglodytes aedon	House Wren	1
Thryothorus ludovicianus	Carolina Wren	1
Polioptila albiloris	Gnatcatcher	1
Catharus guttatus	Hermit Thrush	1
Dumetella carolinensis	Gray Catbird	1
Dendroica coronata	Yellow-rumped Warbler	1
Dendroica magnolia	Magnolia Warbler	1
Mniotiltla varia	Warbler	1
Wilsonia pusilla	Wilson's Warbler	1
Spizella pallida	Clay-colored Sparrow	1
Zonotrichia leucophrys	Sparrow	1
Arremonops rufivirgatus	Olive Sparrow	1
Pheuticus melanocephalus	Grosbeak	1
Icterus gularis	Altamira Oriole	1

Surveillance in equines, 2003



6,682 samples

2 WNV (neuropaty)

2,537 seropositives

- **93 % of seropositives were in healthy equines, non vaccinated.**
- **2003 Started Equine WNV immunization.**
- **In process a Mexican WNV vaccine.**
- **Differential diagnosis in 9 cases: Rabies, EEV and SLE.**

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Actualization of mosquito species, 2003

Ae. aegypti
Ae. albopictus
Ae. triseriatus
Ae. atrophalpus
Ae. epactius
Ae. ioliota
Ae. vexans
Ae.sp
Ae. scapularis
Ae. taeniorhyncus

An. albimanus
An. pseudipunctipennis
An.quadrimaculatus
An.sp.

Cx. restuans
Cx. corniger
Cx. coronator
Cx. erraticus
Cx. sallinarius
Cx. interrogator
Cx. nigripalpus
Cx. quinquefasciatus
Cx. tarsalis
Cx. stigmatosoma
Cx. thriambus
Cx. pipiens
Cx. bigoti
Cx. sp.
Cx.lactactor
Cx.bidens

Ochlerotatus epactius
Ochlerotatus scapularis
Ochlerotatus sollicitans

Orthopodomyia sp.
Orthopodomyia signifera

Psorophora ciliata
Psorophora confinnis
Psorophora cyanenscens
Psorophora columbiae
Psorophora ferox
Psorophora toltecum

Coquilletidia sp.
Manzonia indubitans
Uranotaenia. iowii
Toxorhynchites sp

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What will be specting:

Will be dengue infection protecting or modifed the epidemiological paterns in Latinamerican population for WNV?

“.. It was found that hamsters were protected against West Nile virus if previously immunized with any of the four dengue virus. ..”

“.. in the first few days after challenge with West Nile virus, the dengue immunized hamsters show much less virus in their brains than the control hamsters. However, by the day 7 there is just a much West Nile Virus present in the brains of the immunized hamsters as their control hamsters. In spite of this fact, however, the majority of the immunized hamsters live in contrast to all the control hamsters that die. ..”

Winston H. Price and Inderjit S. Thind. American Journal of Epidemiology, vol. 94, no. 6, 596-607, 1971

"Infection and mortality rates, follwing intraperitoneal inoculationof 10^4 $TCID_{50}$ of *West Nile Virus* (WNV), in nonimmune (control) hamsters, and in hamsters prevfiously immunized with Japanese encephalitis (JE) SA14-2-8 vaccine, *St. Louis encephalitis virus* (SLEV) strain 23379, or yellow fever (YF) 17D vaccine"

Immune group	Non infected with WNV	No. infected (%)	No. died (%)
Nonimmune	**30**	**30 (100)**	**14 (47)**
JEV SA 14-2-8	**30**	**30 (100)**	**0 (0)**
SLEV BeAr 23379	**32**	**32 (100)**	**0 (0)**
YFV 17D	**30**	**30 (100)**	**4 (13)**

Robert Tesh et al, Emerging Infectious vol. 8, No. 3 – pages: 245-251, March 2002

Some factor to influence WNV patterns distribution and recognition:

1. **Infections with JEV or SLEV protects hamsters for severity and fatalities with WNV natural infections**

2. **Previously infections with JEV and SLEV produced much lower viremias of WNV**

3. **Difficulties of serologic diagnosis of WNV for animals with previous infections with others *Flavivirus*.**

Robert Tesh et al, Emerging Infectious vol. 8, No. 3 – pages: 245-251, March 2002

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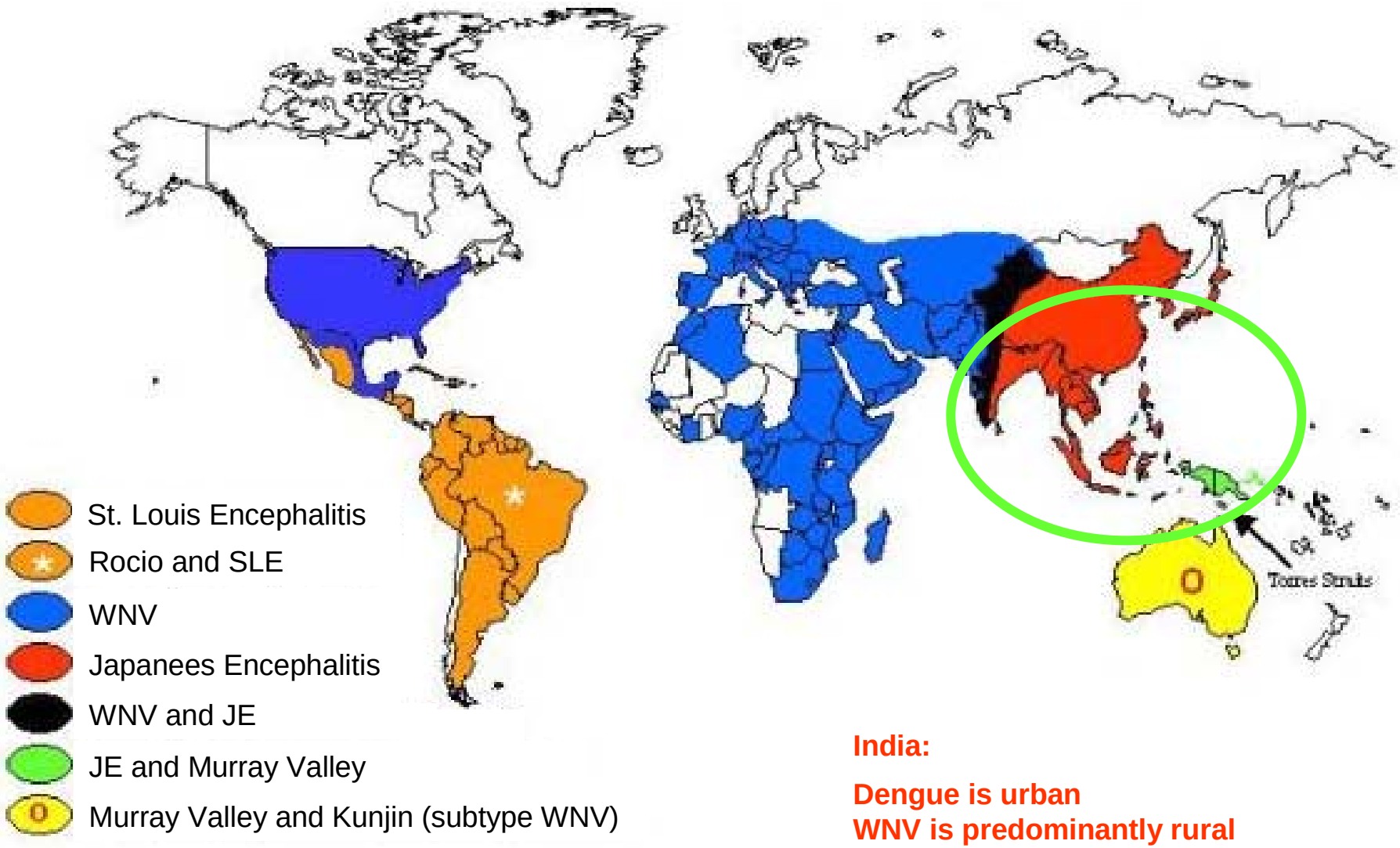
Cross reaction with antibodies of WNV, Dengue and Yellow Fever

Serum	Antigen		
	Den	WNV	YF
Primary infection of Dengue	++	+	+
Secondary infection with Dengue	++	++	++
Primary infection with WNV	+	++	+
Secondary infection with WNV	?	++	?
Yellow Fever Immunization	-	-	++

R. Tesh, Presentation from The International Simposium Villahermosa, Tabasco, Mexico, 2003.

Geographic distribution of virus serocomplex of Encephalitis Japanees



India:

Dengue is urban
WNV is predominantly rural

How is working the Mexican Dengue Vector Control Program?

WNV prevention and control are within Dengue Program

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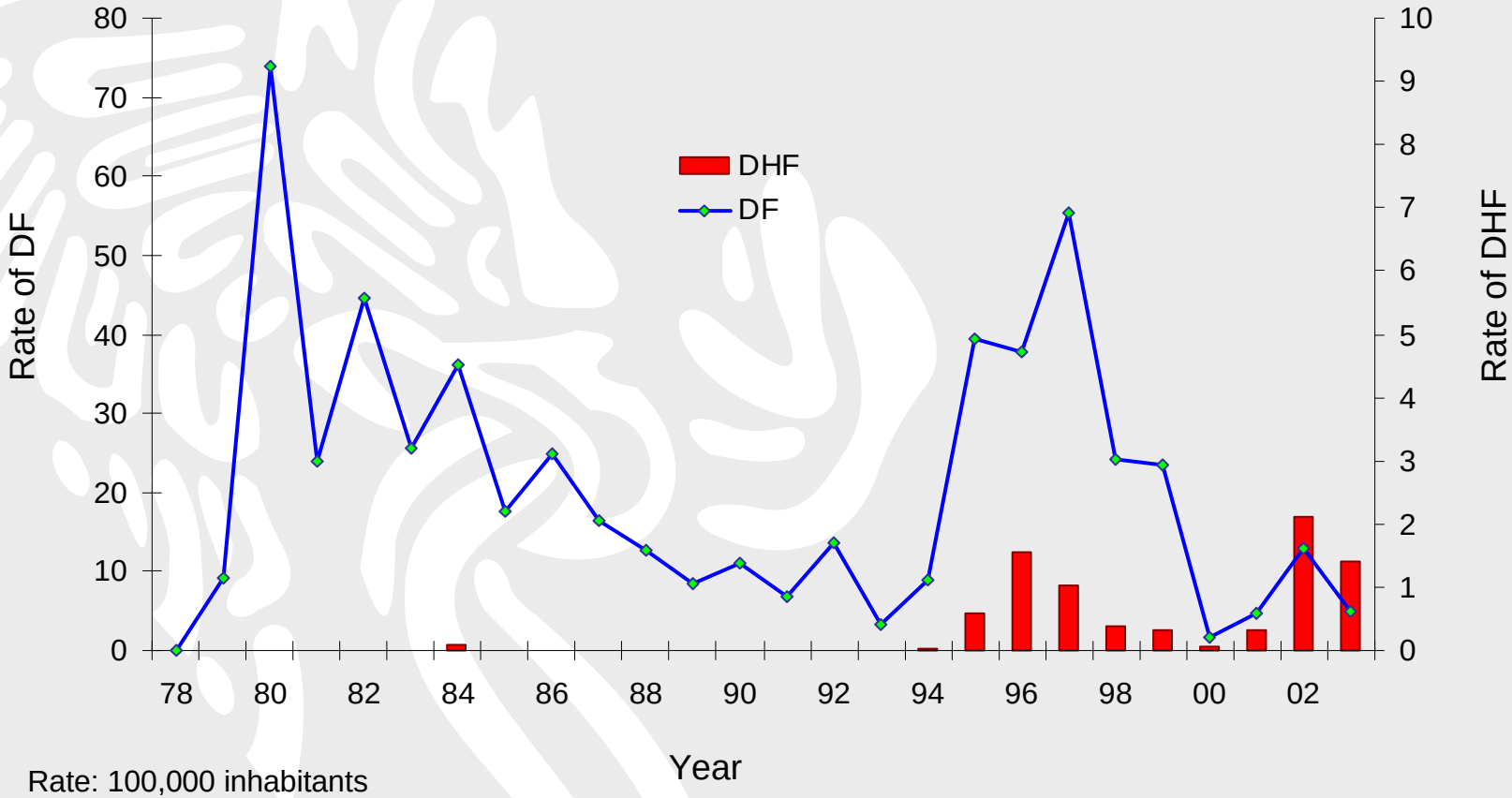
Morbilidity of Dengue Fever and Dengue Hemorrhagic Fever
Mexico, 1978 – 2003*



Rate: 100,000 inhabitants
* Preliminary data

Total cases 1978-2003 = 458,891

DF = 451,226 cases

DHF = 7,665 cases

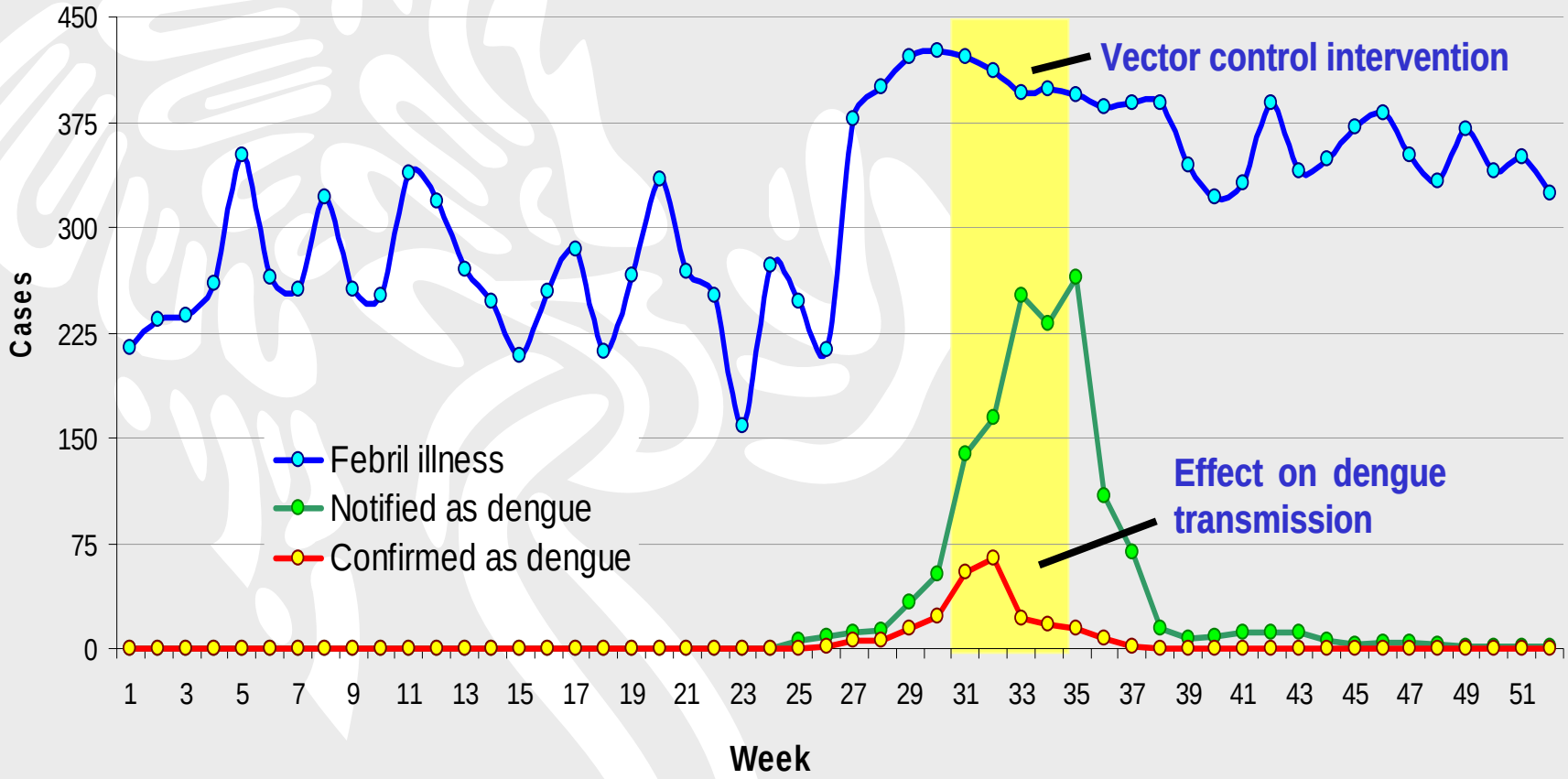
- **There are evidence that almost 70% of school children, in some regions, have dengue antibodies for secundary infection.**

- **458,891 clinical cases were notifying, many with confirmed laboratory diagnosis.**

- **From 1999 there were most frecuent and severe outbreaks of DHF.**

- **Almost 60 millions of mexicans live in dengue endemic areas (60%).**

Diference between febriles, suspected and confirmed Dengue cases, and vector control impact Merida, Yucatan, 2002



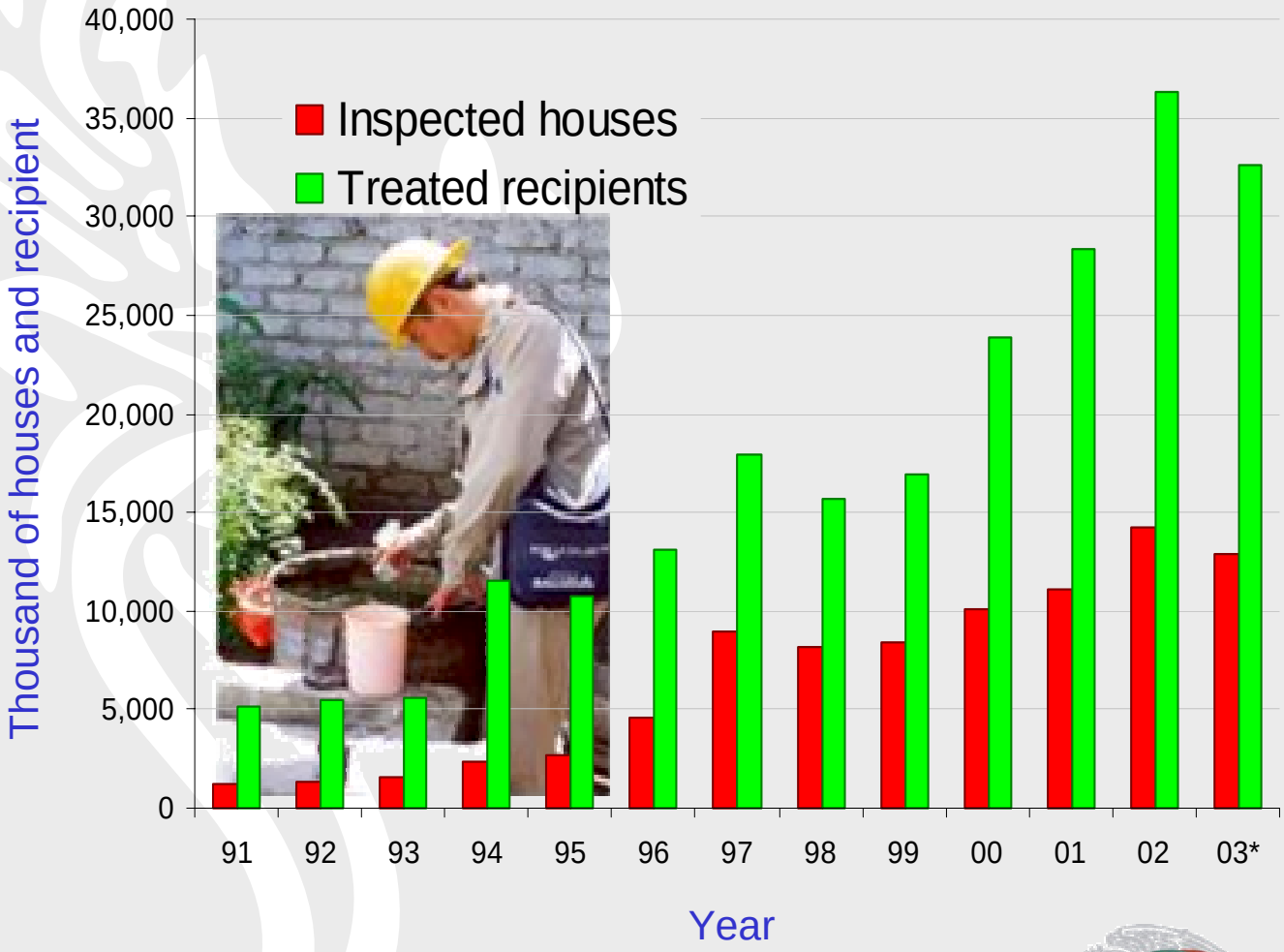
Source: CENAVECE y SESA Yucatán, informes del control del brote de dengue.

Aedes aegypti larvae control activities Mexico, 1991 – 2003*

Localities

91	4,249
92	3,937
93	3,663
94	4,402
95	4,449
96	9,952
97	12,283
98	12,085
99	12,343
00	18,669
01	13,045
02	20,465
03 *	16,356

* Preliminar data

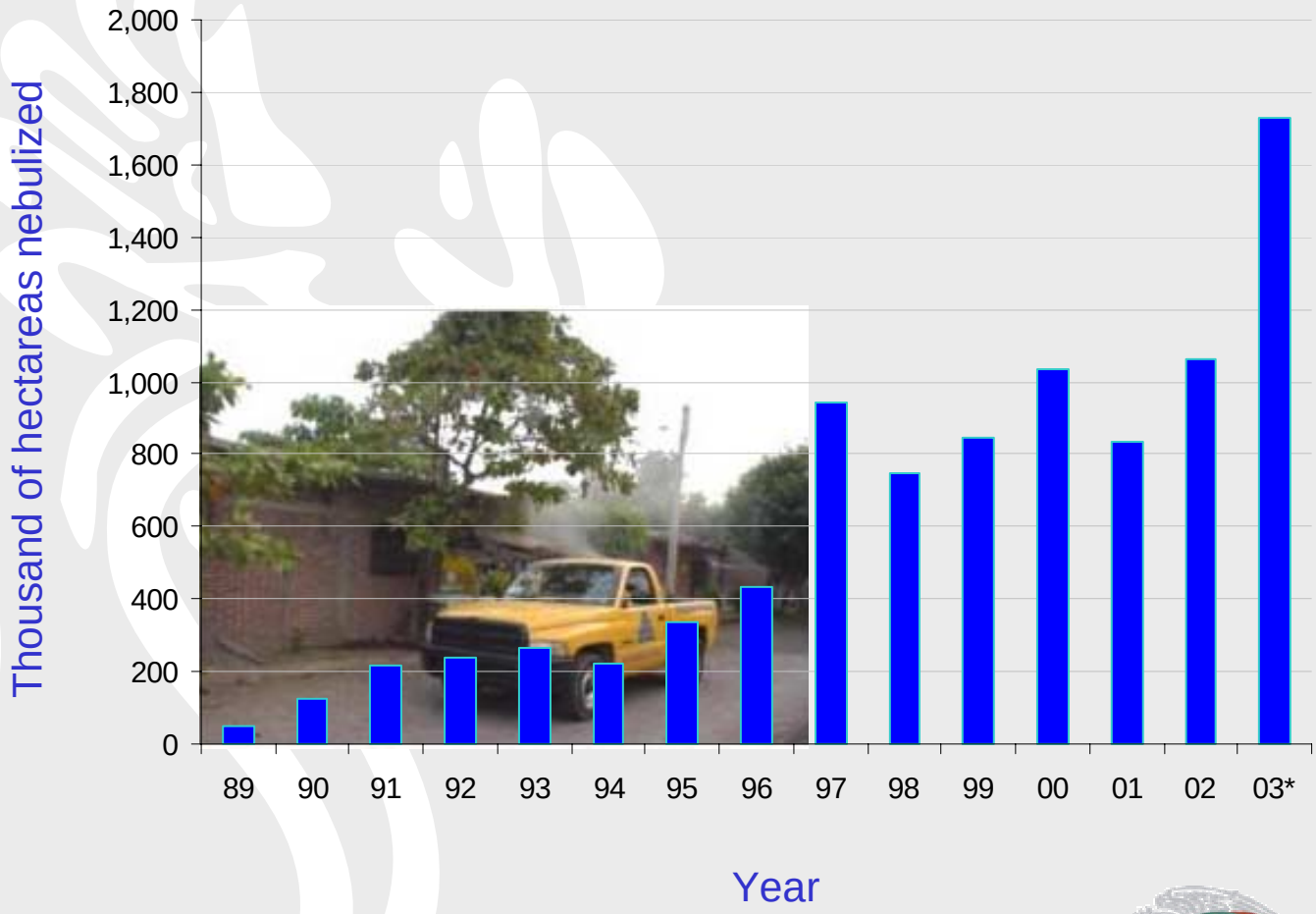


Coverage more than 60 millons of people

Aedes aegypti adult control activities Mexico, 1991 – 2003*

Localities

91	720
92	868
93	1,059
94	2,634
95	3,183
96	4,111
97	5,881
98	5,158
99	7,629
00	8,835
01	8,525
02	9,544
03	9,901

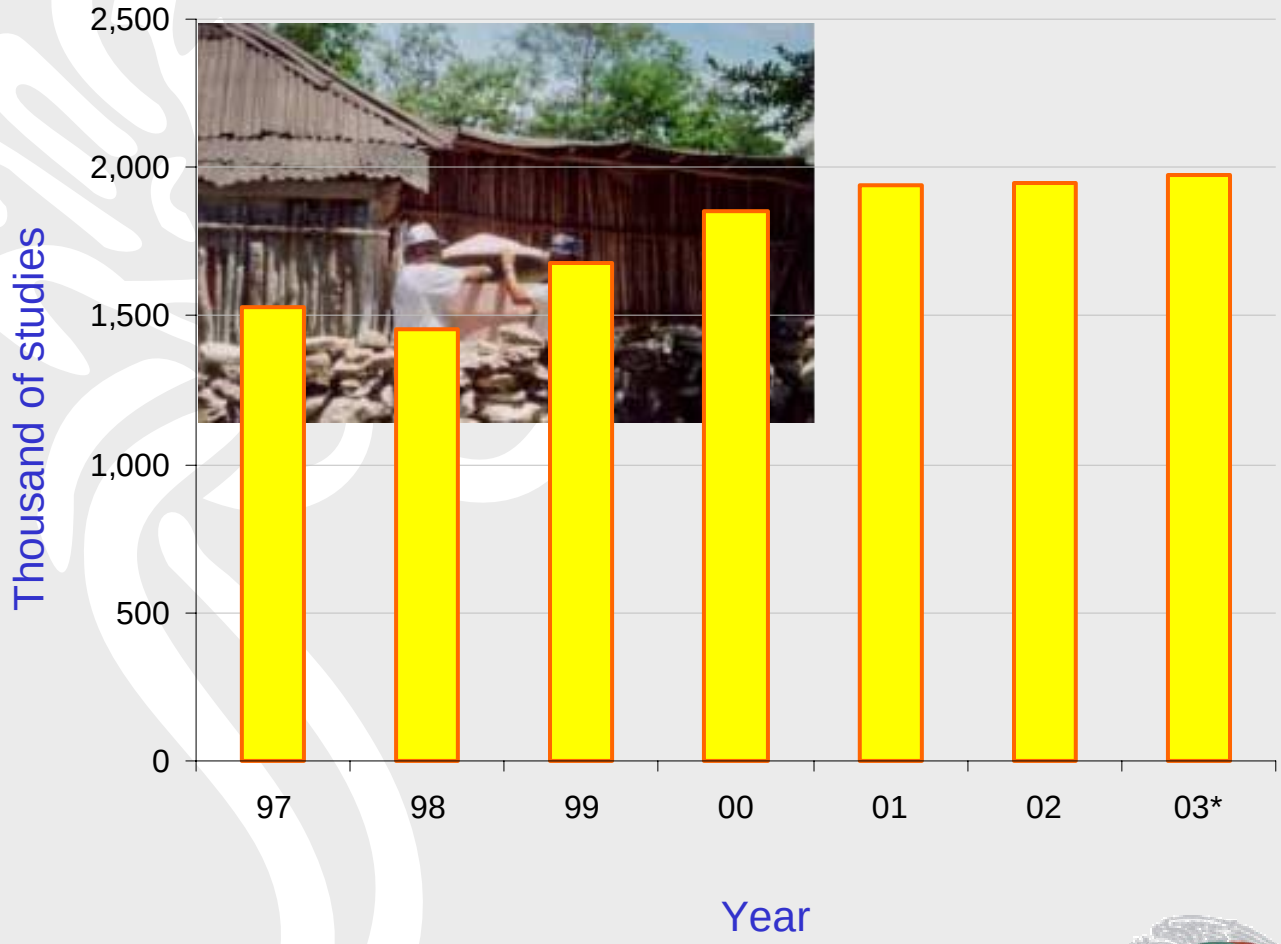


* Preliminar data

Entomological studies Mexico, 1997 – 2003*

Localities

97	7,530
98	6,359
99	8,104
00	14,013
01	18,992
02	13,846
03 *	14,264



* Preliminar data

Community participation

Breeding sites elimination

Personal protection

Clean the patio

Thank you

And I hope that we can do it better with your colaboration