Achievements & Challenges of T & T Control Operations in the Southern Rift Valley of Ethiopia

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8. Results Achieved
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11. SIT Field Monitoring
12. Achievements
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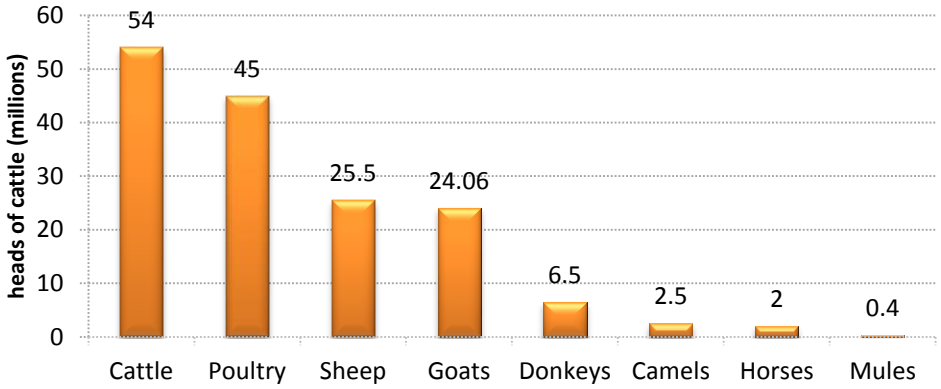
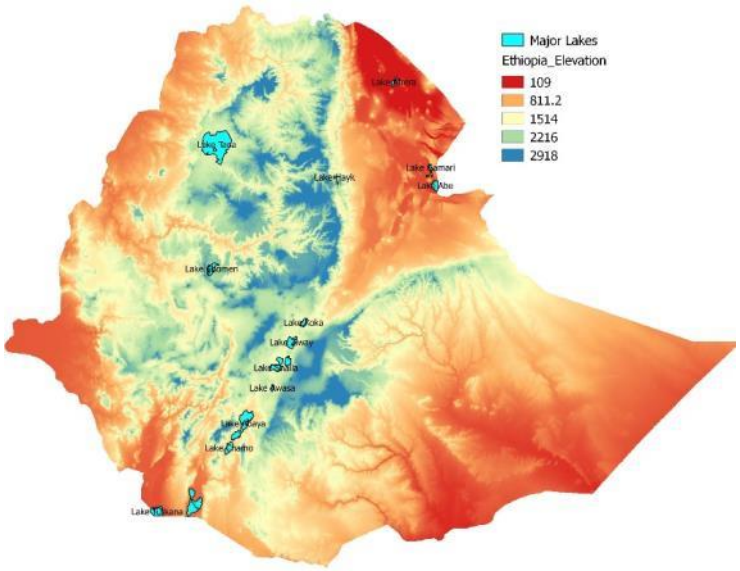
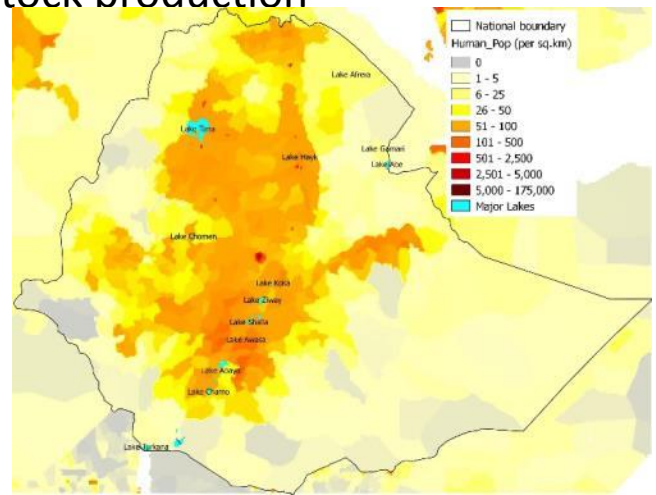
Introduction

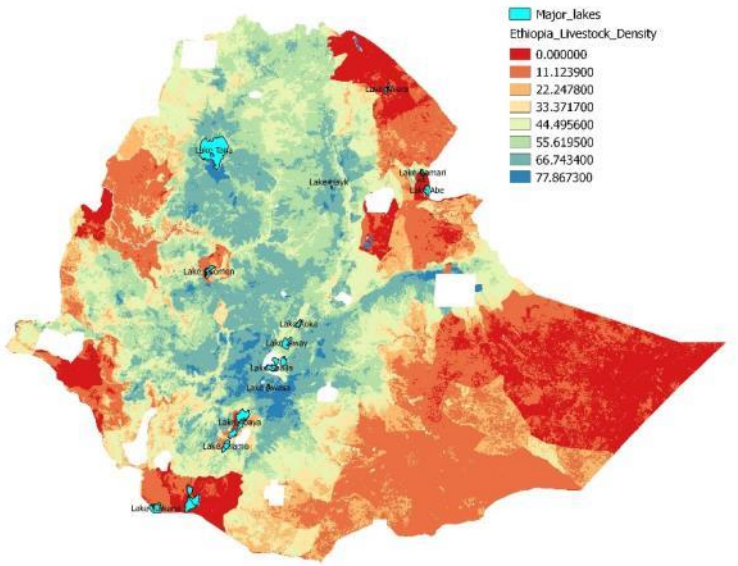
Ethiopia livestock





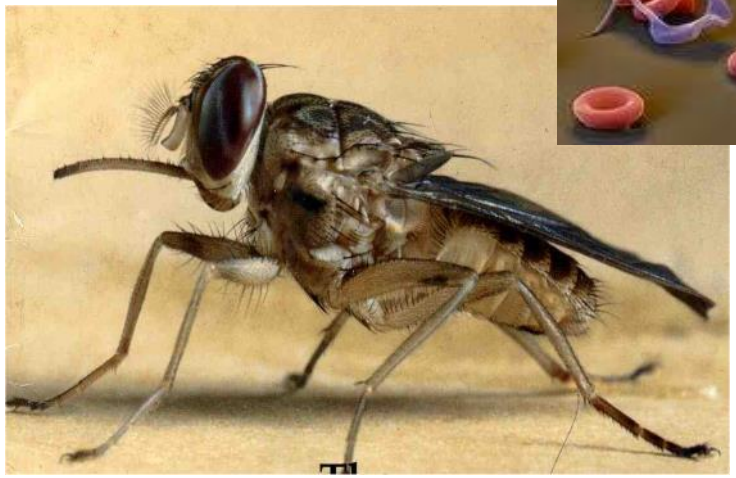
- The highlands are overpopulated
- Lowlands are underutilized
- Challenges for livestock production

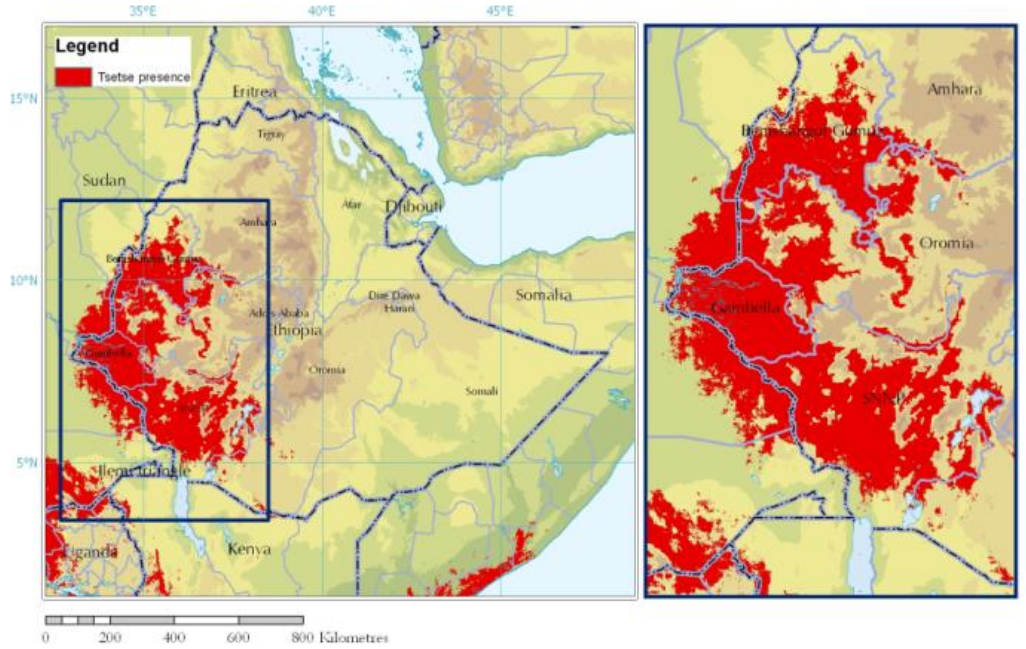




Tsetse & Trypanosomosis in Ethiopia

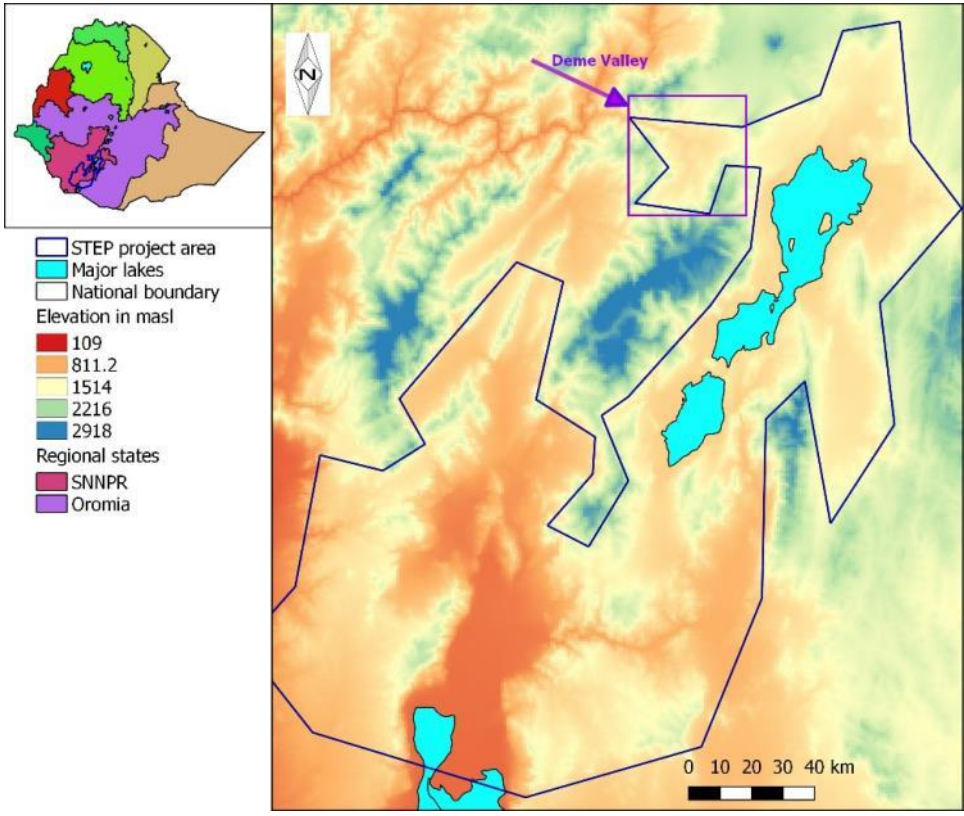
- Tsetse is the cyclical vector of trypanosomosis
- No human cases in Ethiopia
- Control of the disease using drugs
- 200,000 Km^2 area infested with tsetse
- Tsetse Spp present in Ethiopia
    - G. pallidipes
    - G. m. submorsitans
    - G. tachinoides
    - G. f. fuscipes
    - G. longipennis





The Southern Rift Valley

- Only *G. pallidipes* in the main valley
- G. *f. fuscipes* in adjacent small basin (Deme)
- Total area: 25,000 km^2
- Almost Isolated valley
- High potential for livestock & crop agriculture



STEP project

Project goal:

- The expansion and intensification of mixed farming in fertile areas of the region through an area-wide removal of the T&T constraint

Objectives:

- to establish capacity at national and regional levels for sustainable removal of the T and T constraint by integrating different methods, including the sterile insect technique (SIT),
- to introduce and apply these techniques on an area-wide basis to remove the T and T constraint from the Southern Rift Valley of Ethiopia, and
- to create conditions for reducing pressure on highland resources and promoting sustainable agriculture and rural development in the Southern Rift Valley.

Methodology

- Using the AW-IPM principles
- The approach is phased, conditional & dynamic
- Intervention block by block (manageable sizes)
- Integrated use of different technologies
- Community participation
- Baseline survey → Community mobilization → Population suppression → Sterile tsetse fly release

Suppression Techniques Used

Trypanocidal Rx of animals

1. As clearing shot before vector intervention
2. As incentive to bring their animal for tryps dianosis

Pour-on application on cattle

- Deltamethrin 1% applied on the back of animals

Insecticide treated targets (ITT)

- Target treated with 0.4-0.8% deltamethrin
- Blue-Black-Blue targets

Ground spraying of tsetse resting sites

- Tsetse resting sites sprayed with 0.05% deltamethrin

ULV sequential aerosol application (SAT)

- 0.35% deltamethrin
- Aerosol drift technology
- In selected flat areas

Sterile Insect Technique (SIT)

Evaluation Methods

Entomological surveys

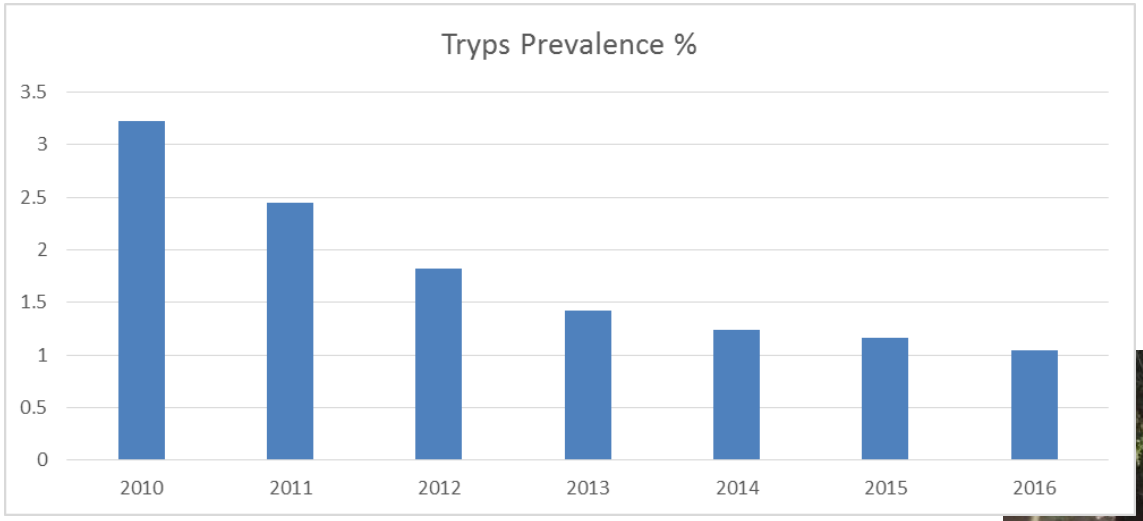
- Odour baited trap deployment
- Sticky panels (for SIT monitoring)
- Weekly serviced for the SIT component and 4 times per year for the rest

Parasitological surveys

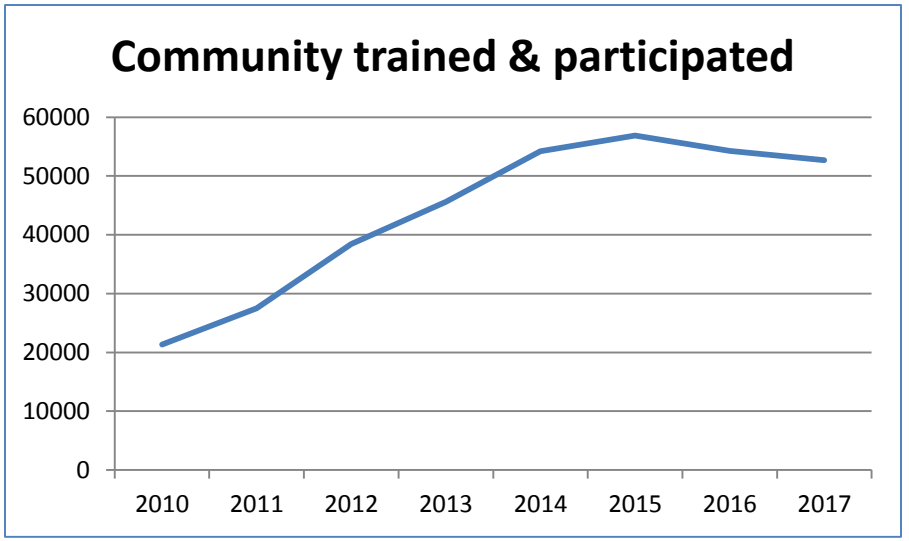
- Microscopic examination of blood from animals
- Buffy Coat Technique

Suppression Results

- 1000,000 pour-on treatments with deltamethrin 1% every year
- 50,000 ITT deployed around tsetse infested areas every year
- 5000 sq.km area treated with SAT (sequential aerosol technique) in 2013/14



- Baseline prevalence of 27% in 1998


Community trained & participated
60000
50000
40000
30000
20000
10000
0
2010
2011
2012
2013
2014
2015
2016
2017

SIT project

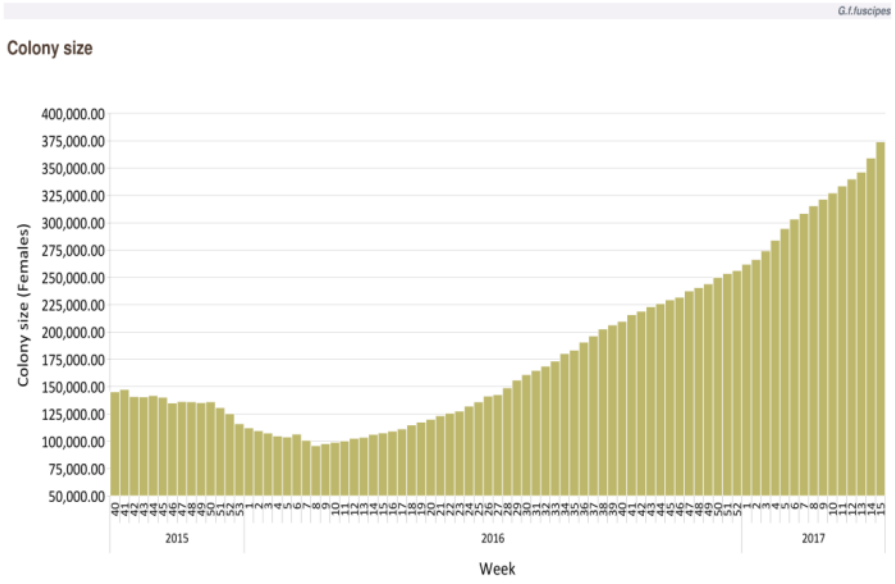
Kaliti insectary and team

SIT component

- Two species of tsetse reared at Kaliti center

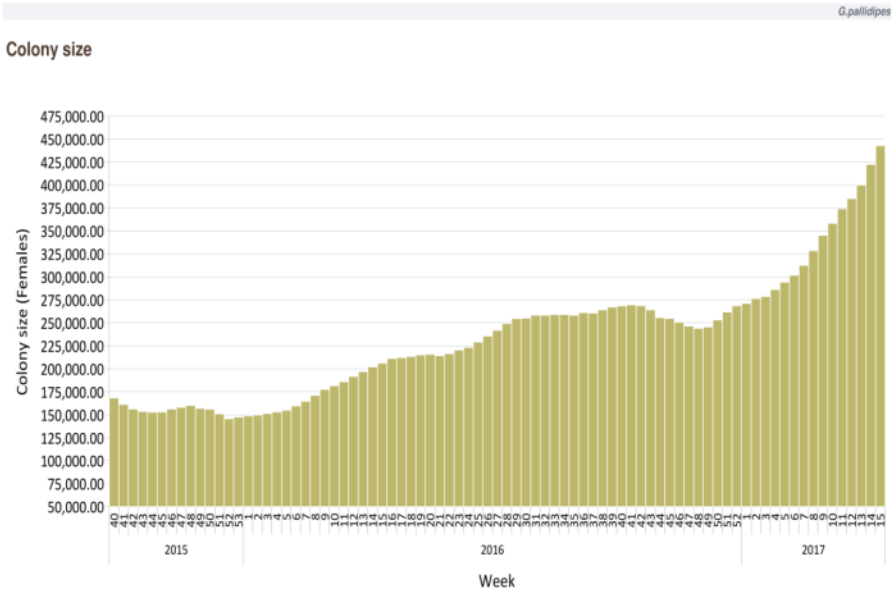
G. f. fuscipes

Colony size: 374,000 females



G. pallidipes

Colony size: 440,000 females



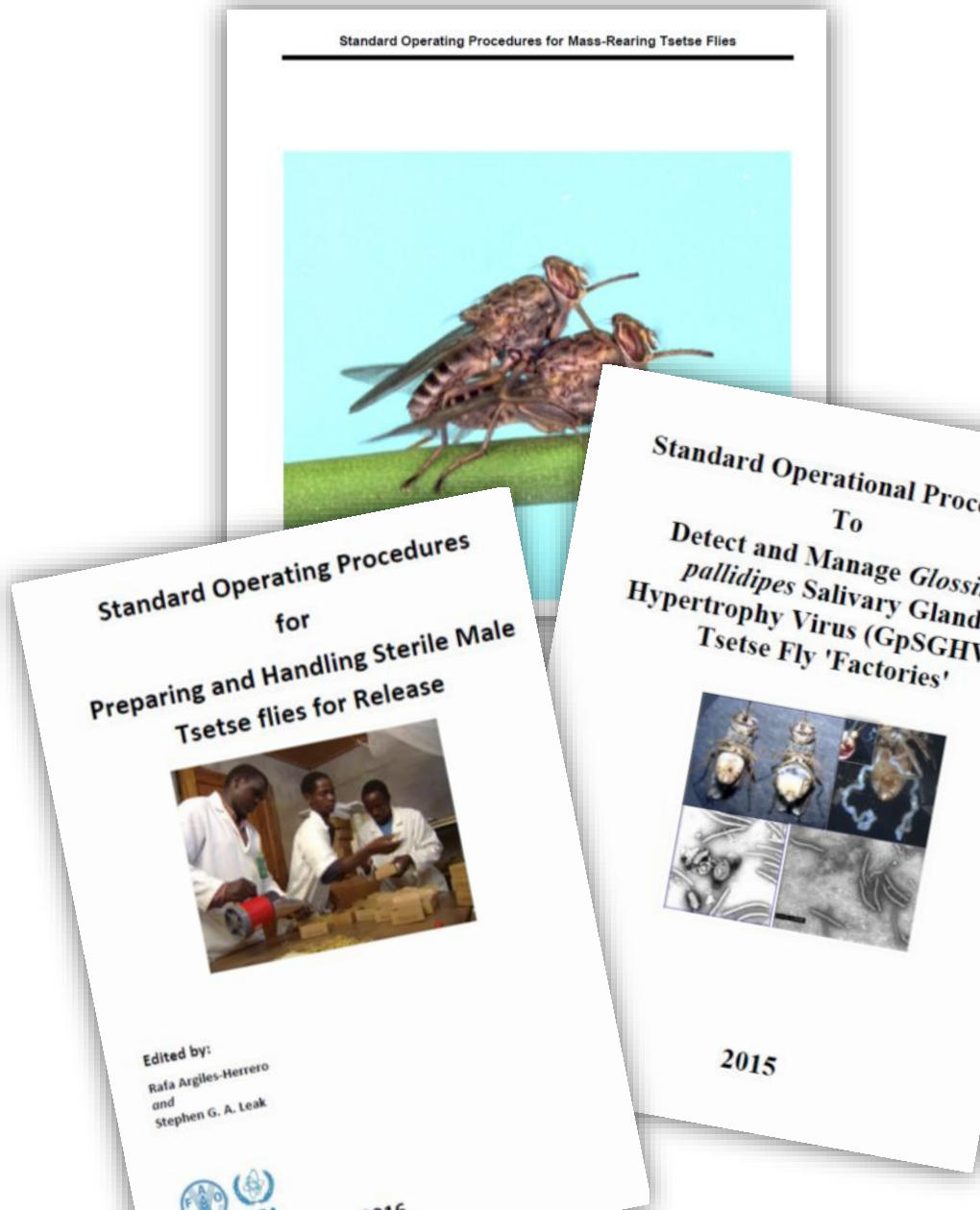
The performance of the colonies has significantly improved in the last 18 months:

G. fuscipes colony

Change in parameters from initial to April /2017			
Tsetse fly rearing parameters	Week 40/2015	Week 15/2017	Increased in folds
Colony Size (N)	145,423	374,135	2.57
Weekly released males (N)	9,162	24,663	2.69
Weekly pupae collection (N)	17,898	79,788	4.46
Fecundity (Pupae/F/10Days)	0.22	0.37	1.68

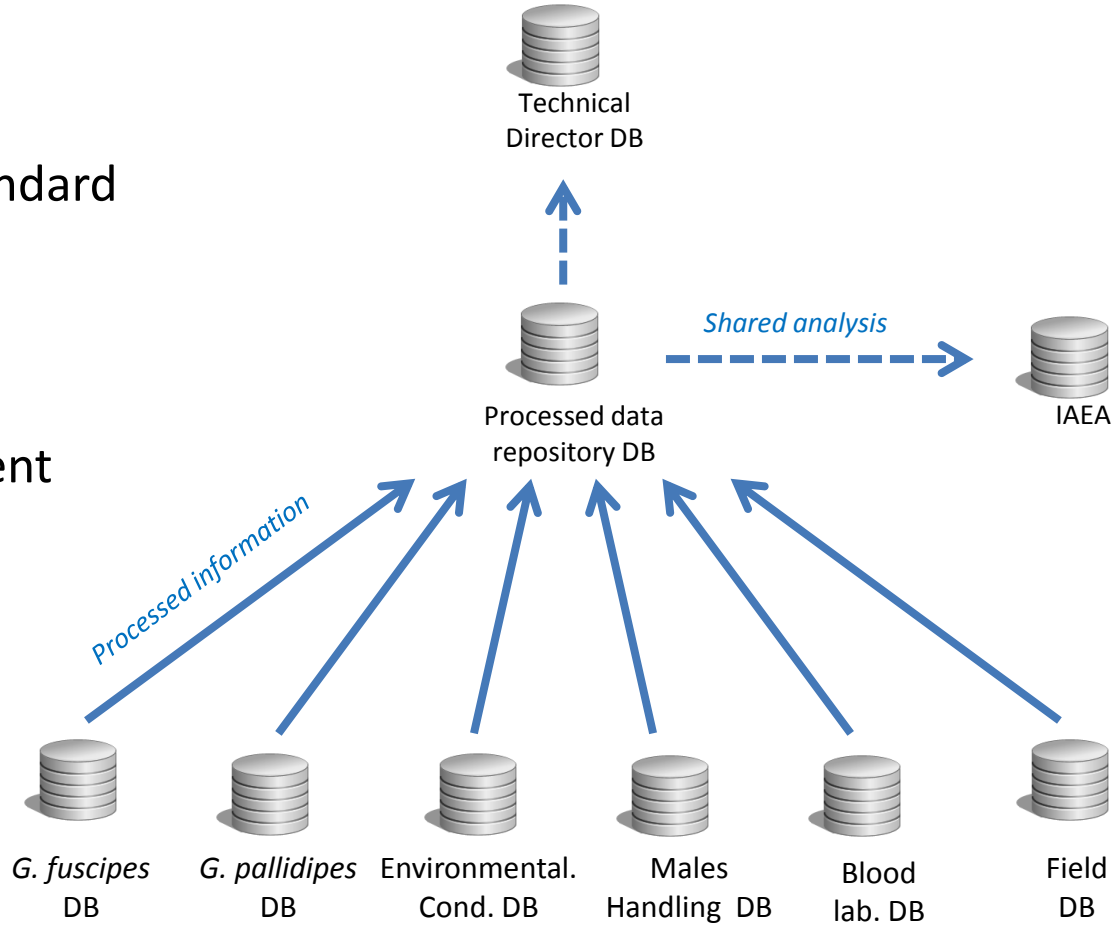
The performance of the colonies has significantly improved thanks to:

- Strict adherence to Standard Operating Procedures



The performance of the colonies has significantly improved thanks to:

- Strict adherence to Standard Operating Procedures
- Huge improvement in information management



- Networked database system
- One DB for each team

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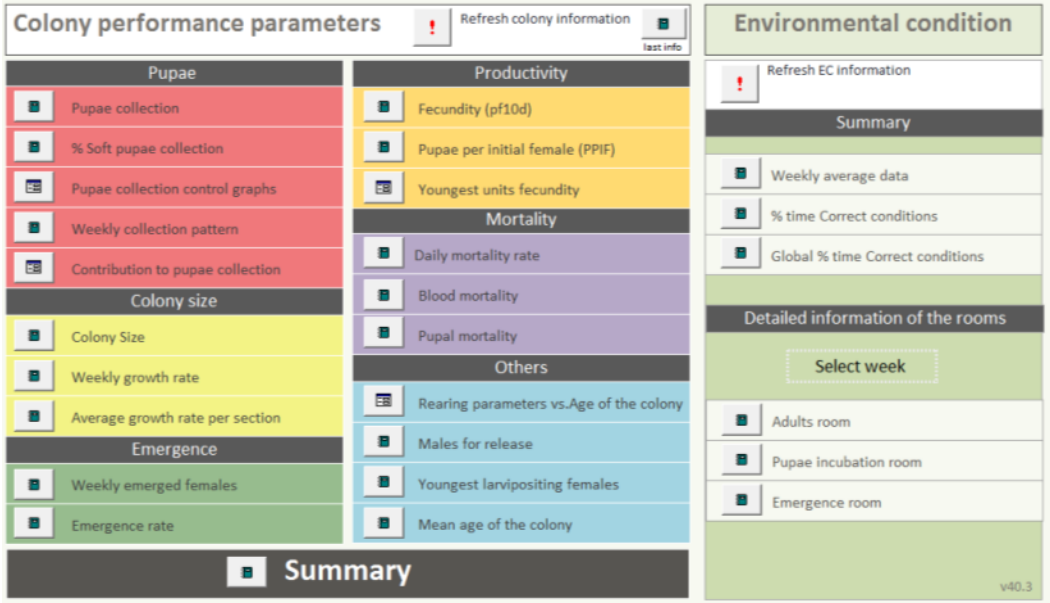

- Extremely user friendly DB
- Analysis module available to Insectary Manager with more than 100 standardised charts

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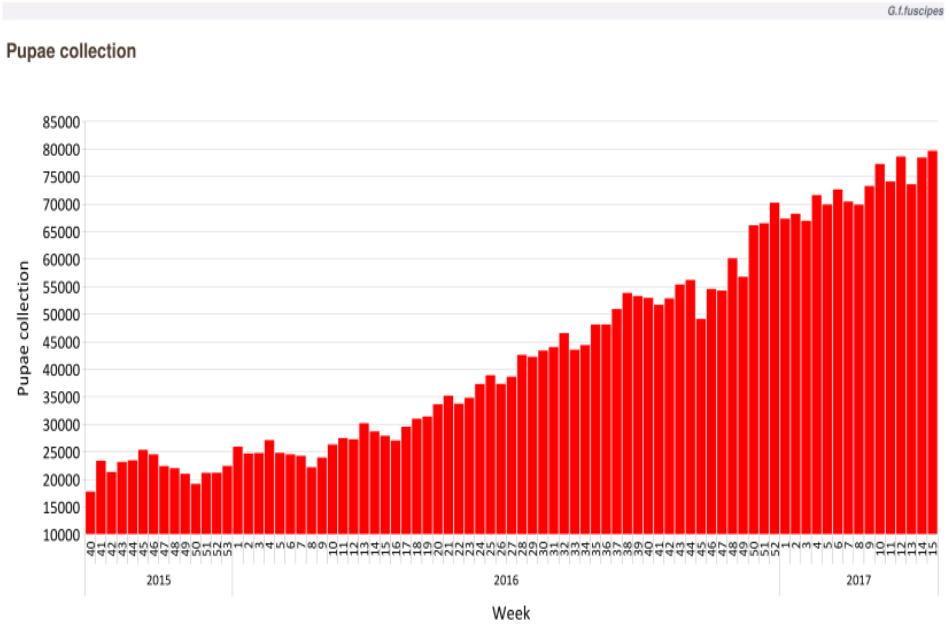

- Ex: pupae collection

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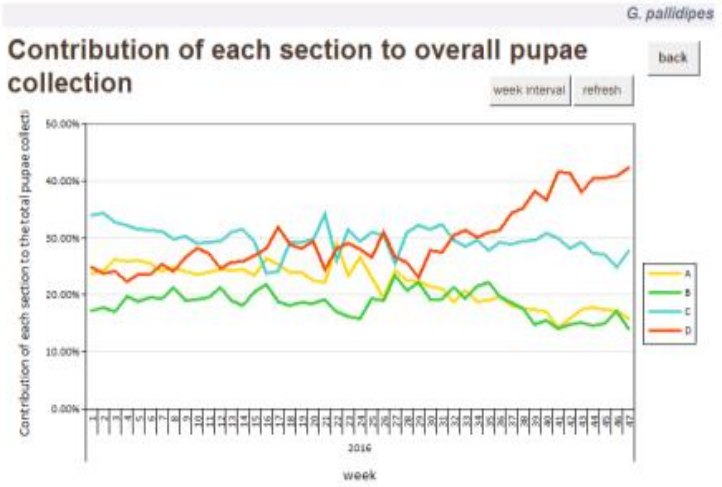

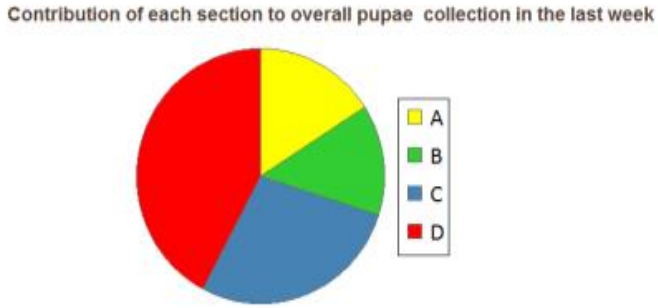

- Ex: Contribution of each section to overall pupae collection

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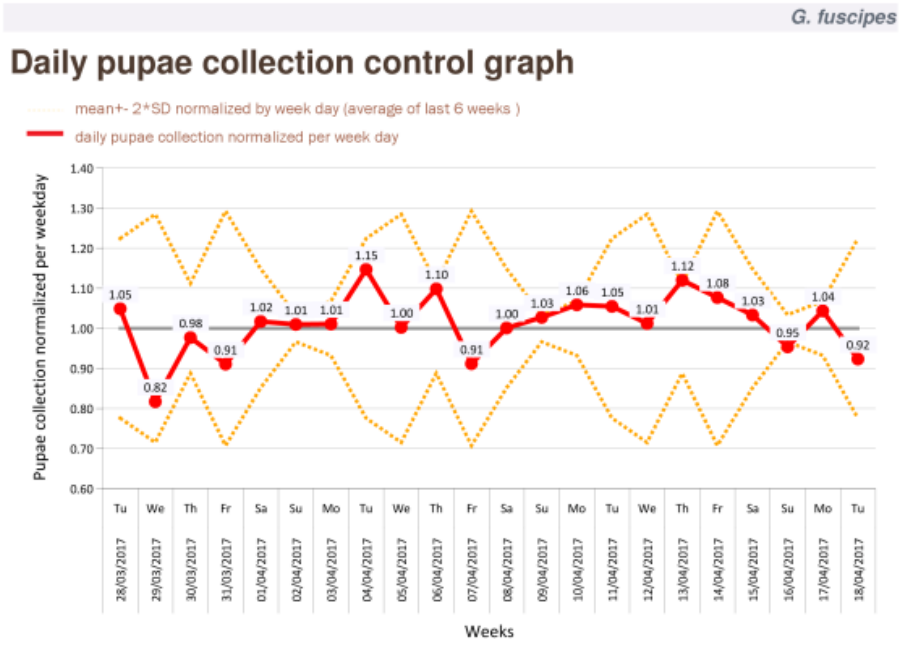

- Ex: Pupae collection control graph

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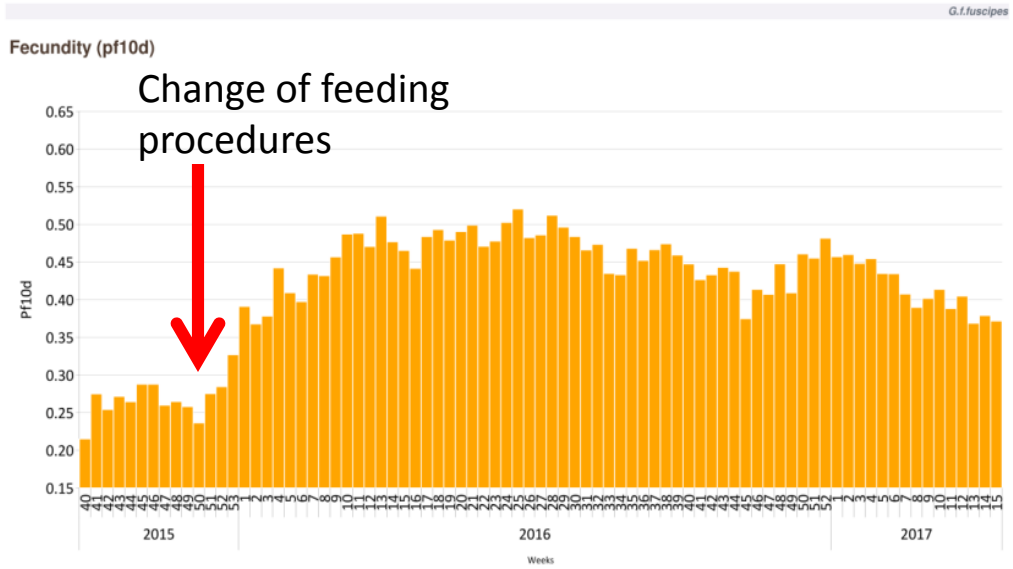

- Ex: Fecundity

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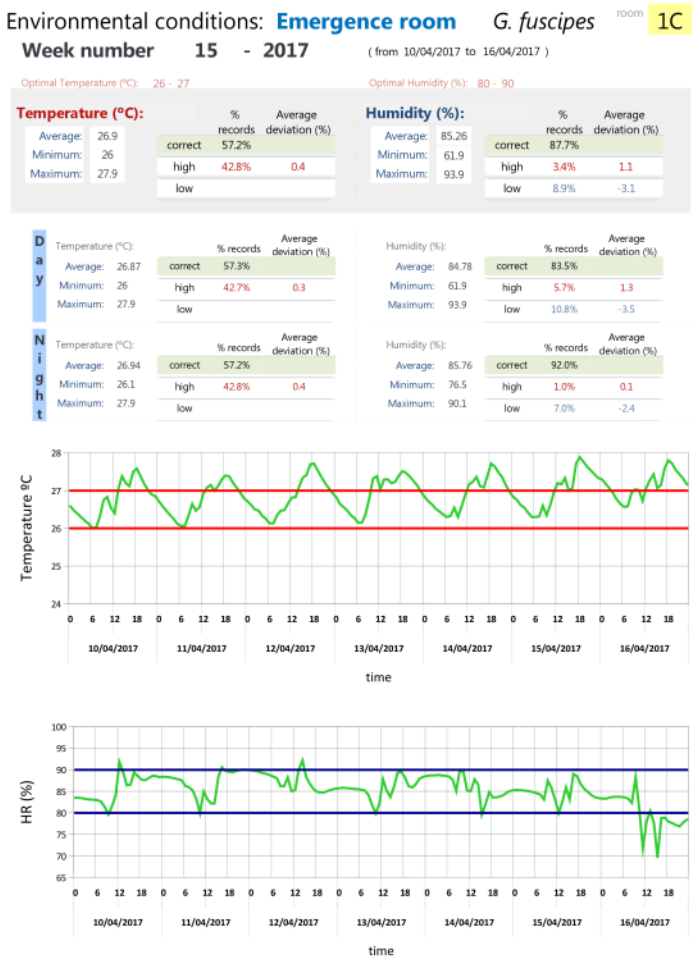

- Ex: Environmental conditions in the rearing rooms

The performance of the colonies has significantly improved thanks to:

- Strict adherence to Standard Operating Procedures
- Huge improvement in information management
- Adaptive management

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- Strict adherence to Standard Operating Procedures
- Huge improvement in information management
- Adaptive management
- Increased motivation of staff by applying a Permanent Training Programme

Tsetse colony performance

- Problem due to Salivary gland hypertrophy virus
- Management of SGHV:
  - Valacyclovir treatment &
  - Clean feeding

Figure 2. Tsetse fly abdomen containing SGH

- The SGHV prevalence was around 90% in *G. pallidipes* colony
- No cases of salivary hypertrophy seen (under control)

Sterile Tsetse Fly Release

- Release number:

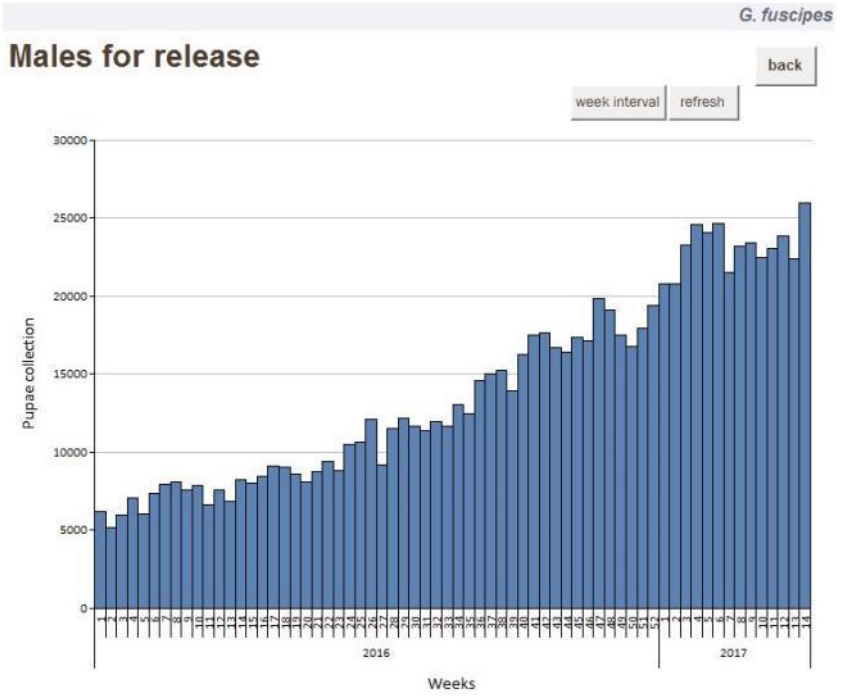
  20,000/Species/Week

- Release rate: 100 sterile males/Km^2

- Using fixed-wing aircraft

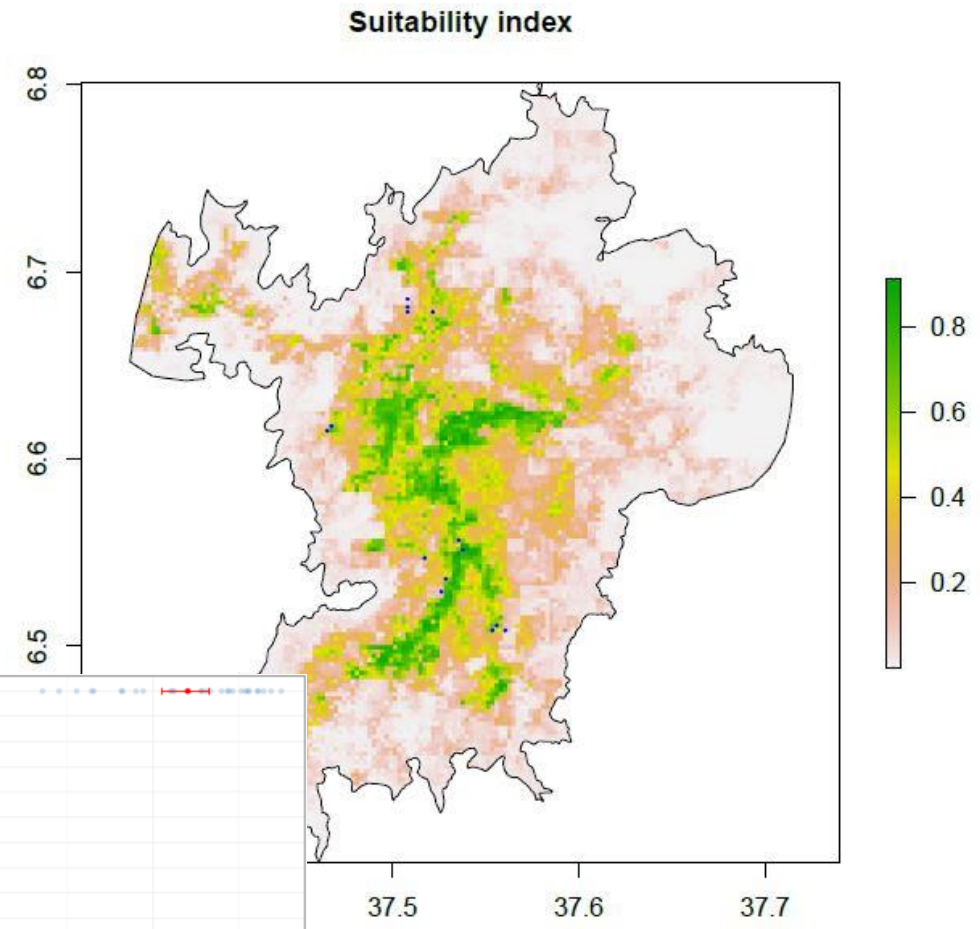
- Released boxes are counted and

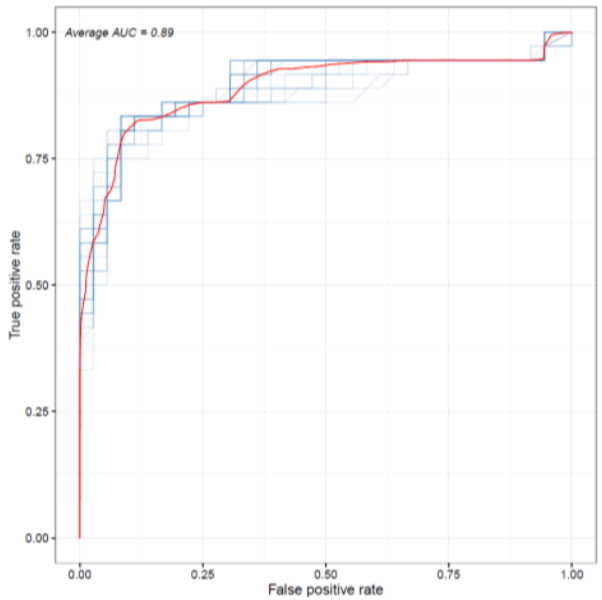
  geo-positions captured

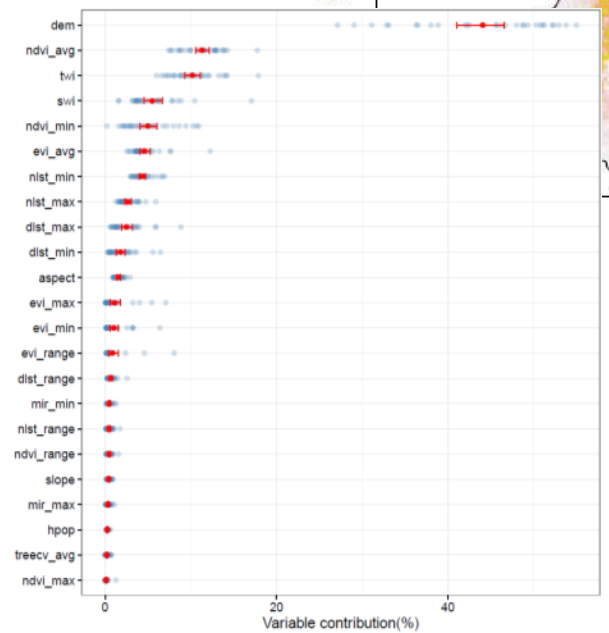


Prediction distribution model

- Maxent prediction model based on factors
  - River system
  - Elevation
  - Vegetation index (MODIS)
  - Climatic conditions (MODIS)







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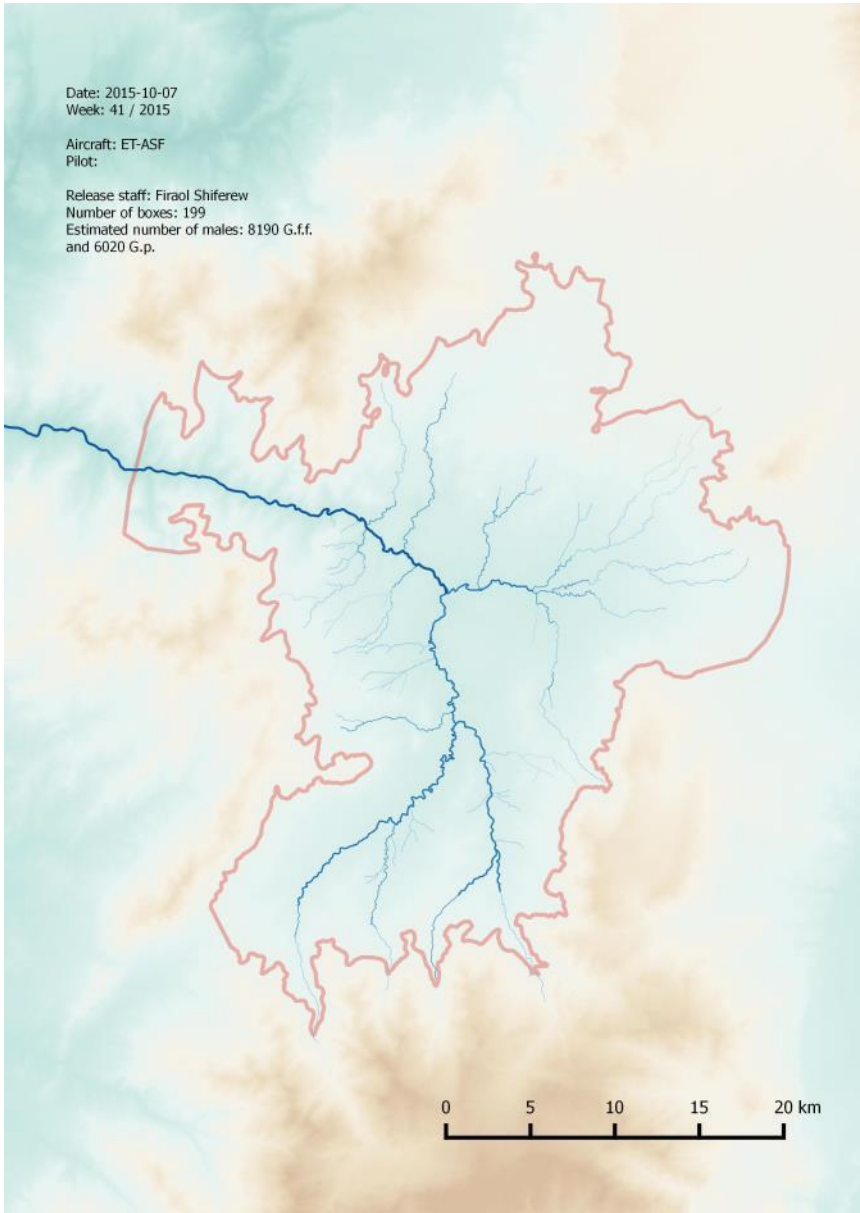
- Monitoring sites selected based on the prediction model
- Sites monitored regularly (every week)
- The average apparent density of flies/trap/day determined
- Data entered into the field database
- Release sections created for flight



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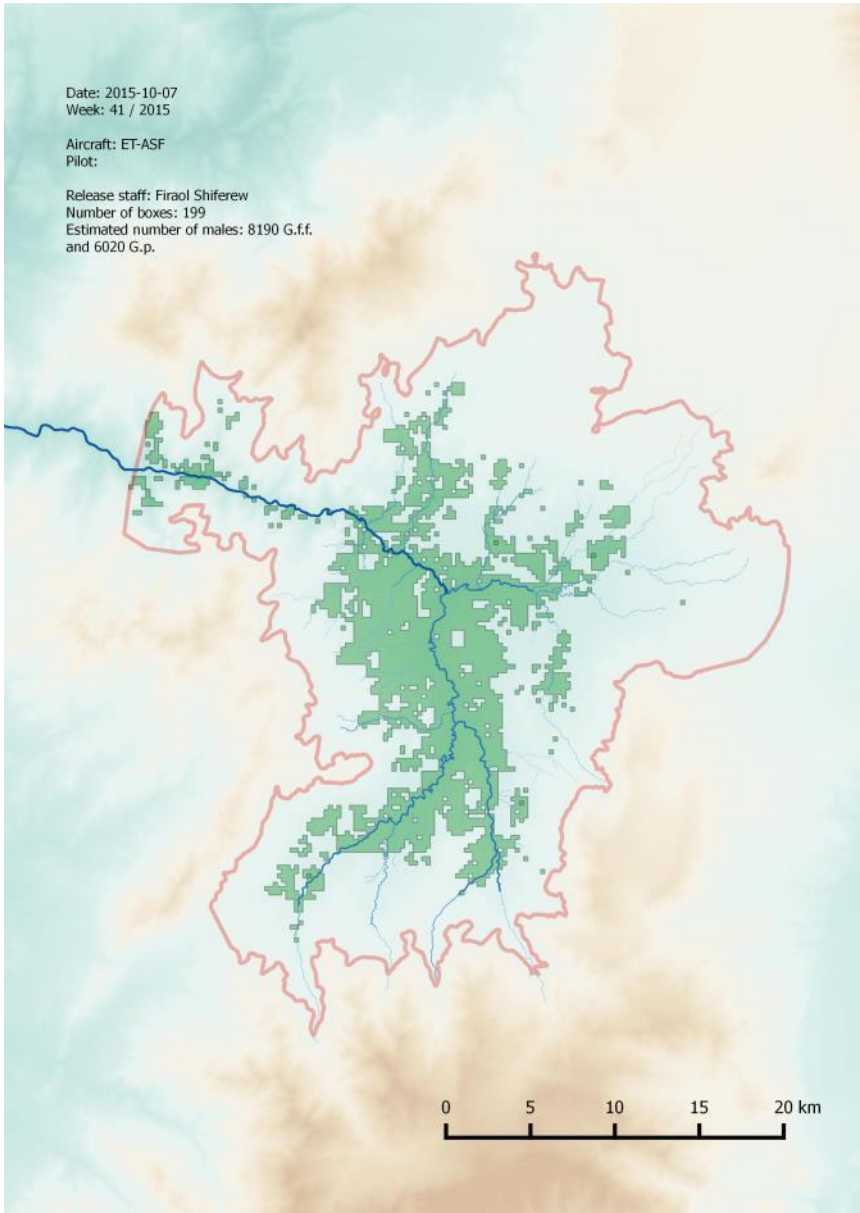

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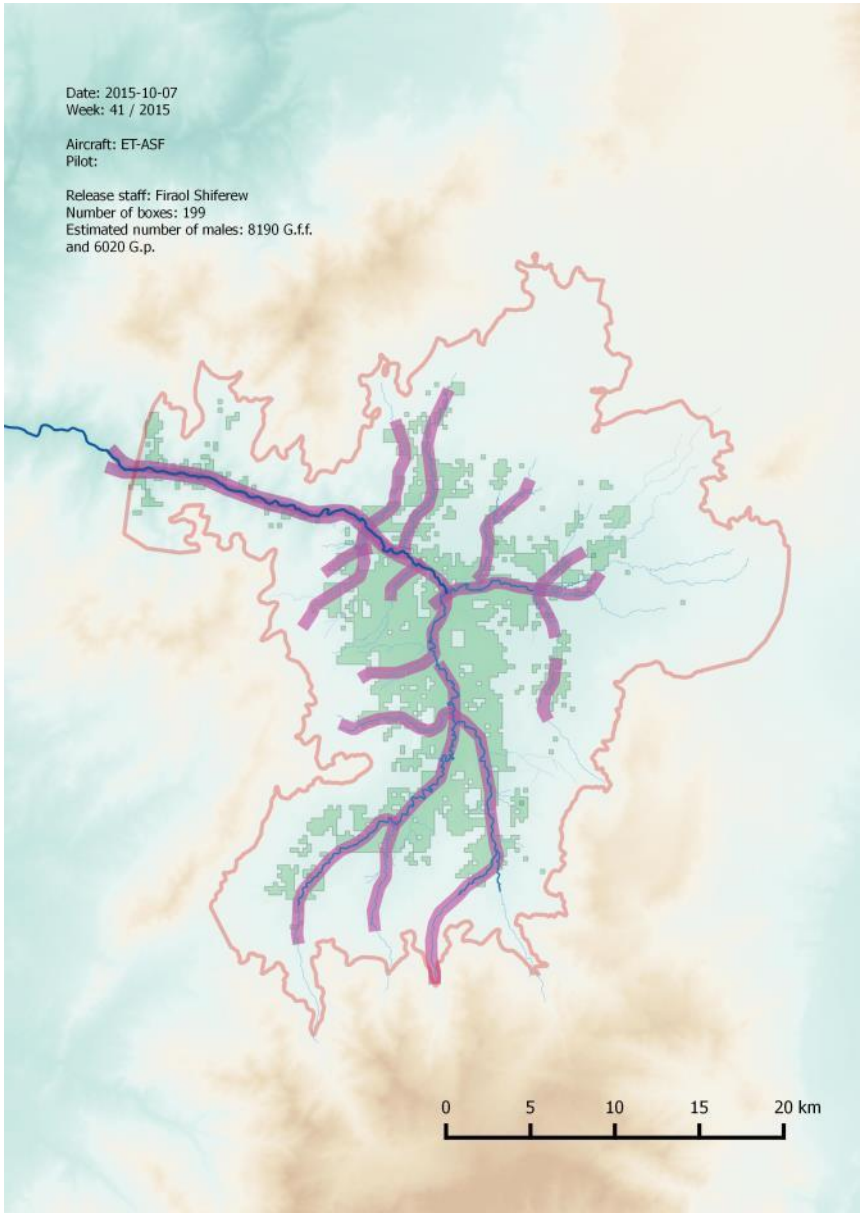

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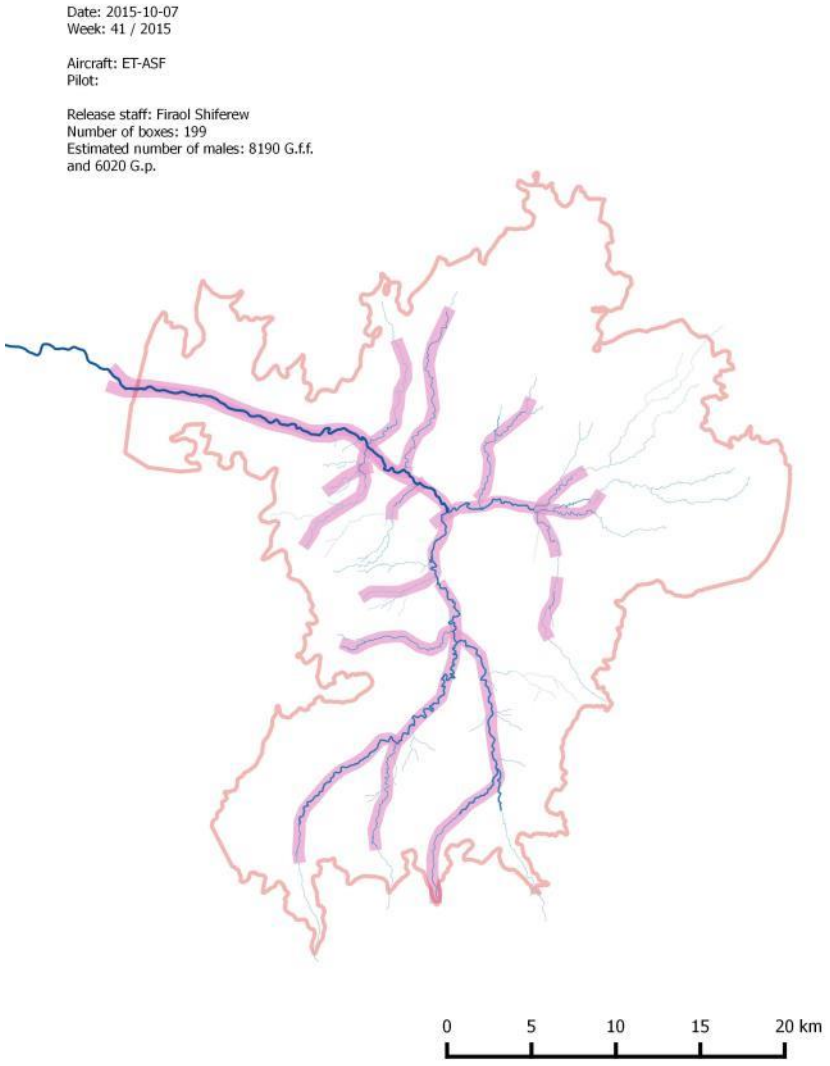
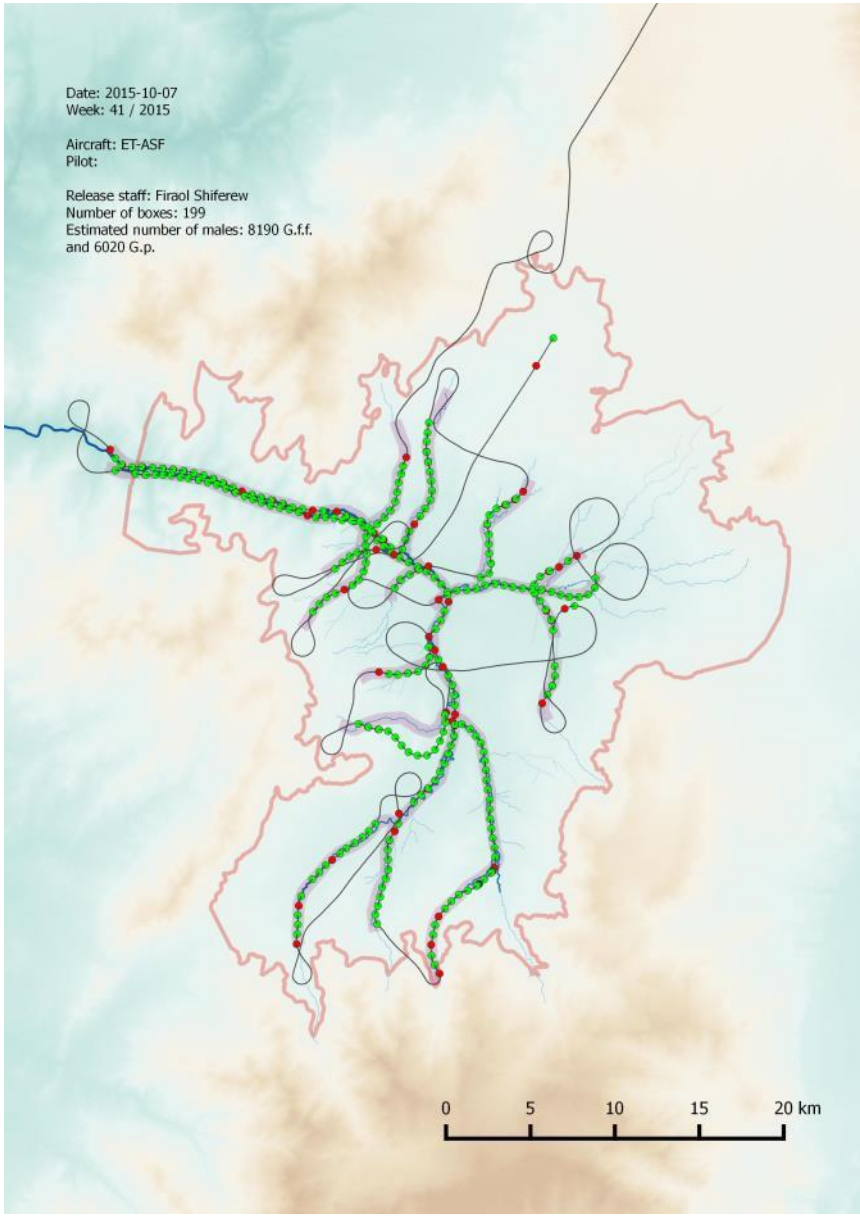
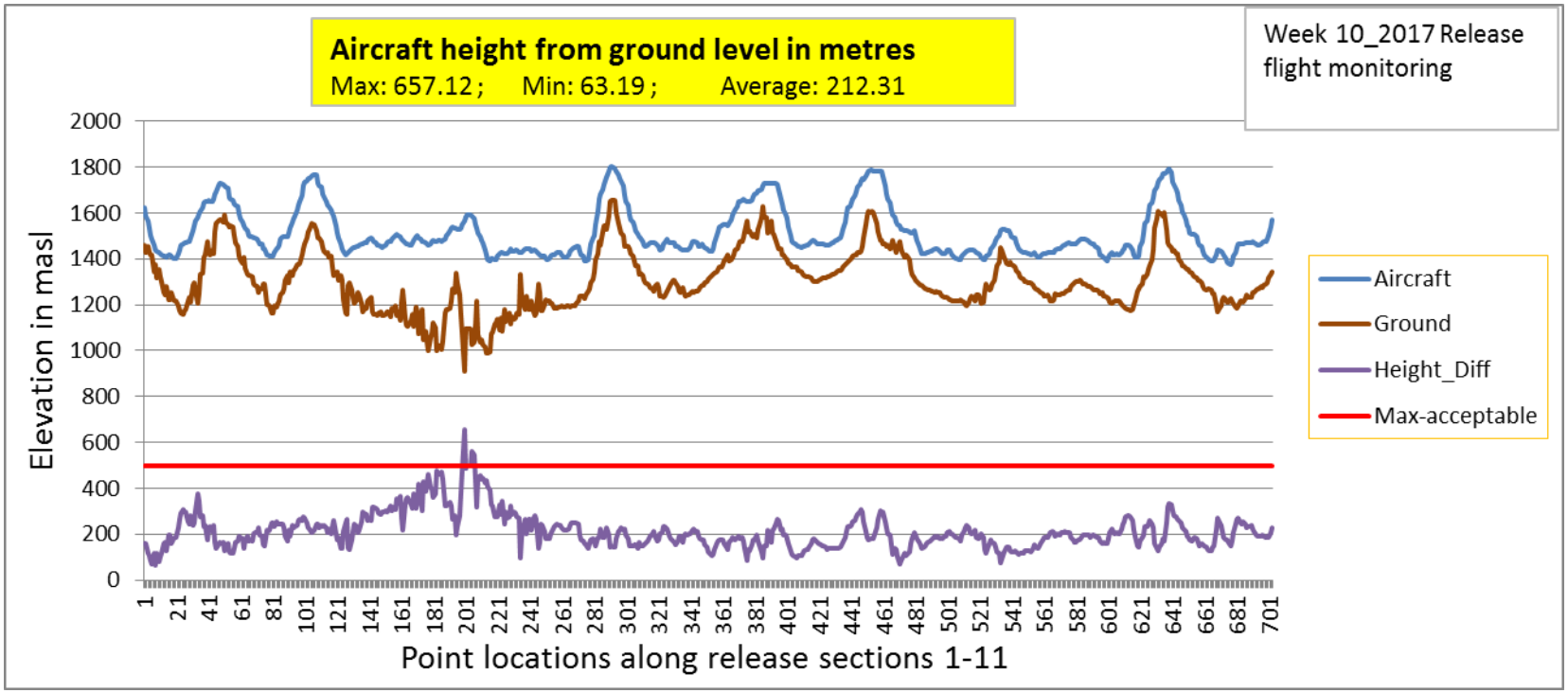


Aerial release

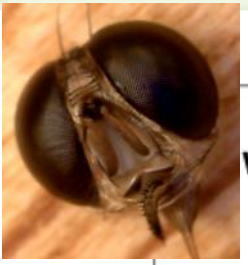


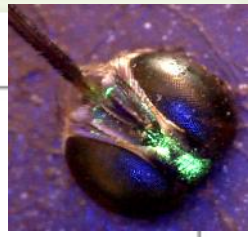
Evaluating the performance of the release

- Flight tracks monitored
- Release height from ground: average 260 meters



SIT field monitoring





Wild

Sterile

AD of wild females : 0.058
AD of wild males : 0.044
AD of wild flies : 0.102
AD of sterile flies : 0.453
Traps with positive wild catches : 23
Traps with positive sterile catches : 63
Sites with positive wild catches : 11
Sites with positive sterile catches : 22
Over-flooding ratio : 10.233

0 5 10 15 20 km

Apparent density of G. fuscipes in Deme Valley:

Survey in FMS

Week 42, 2016

Number of traps deployed: 98
Number of sites: 24

Start date: 2016-10-17
End date: 2016-10-23

Sites with positive wild catches: 11 (45.8%)
Sites with positive sterile catches: 22 (91.67%)

Legend

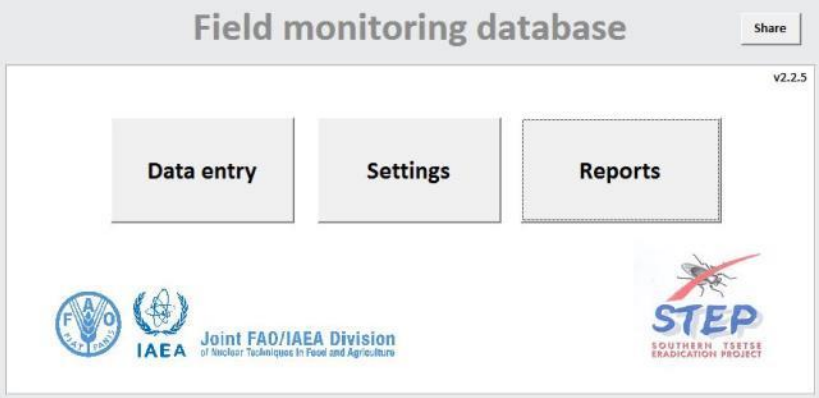
AD_Wild: 0, 0-0.1, 0.1-0.25, 0.25-0.5, 0.5-1.5, 1.5-3.0, >3

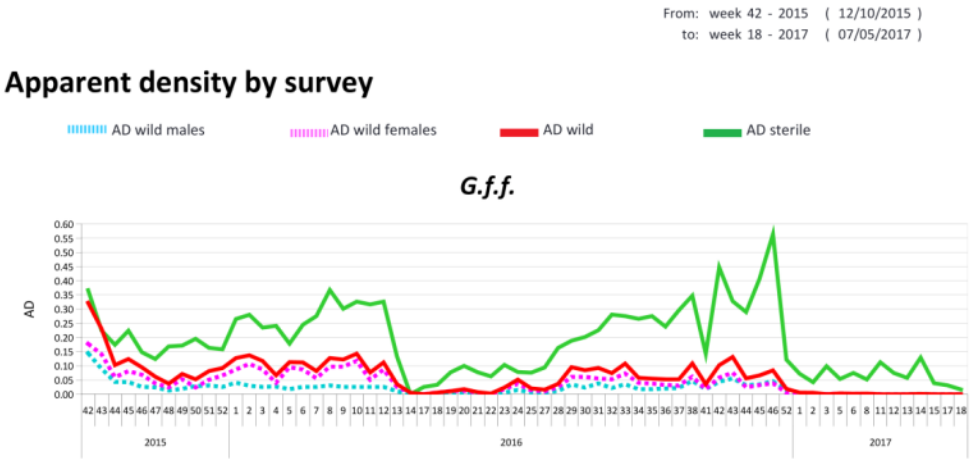
AD_Sterile: 0, 0-0.1, 0.1-0.25, 0.25-0.5, 0.5-1.5, 1.5-3.0, >3

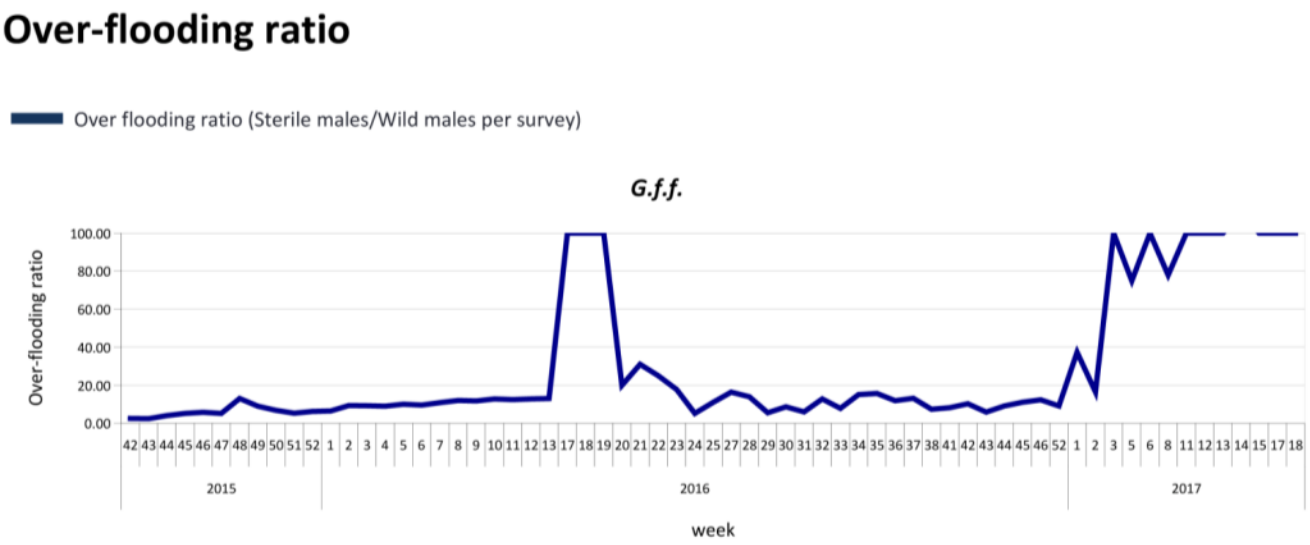
water courses: Seasonal, Permanent

roads: roads, paths, predicted distribution, Release Sections

SIT field monitoring





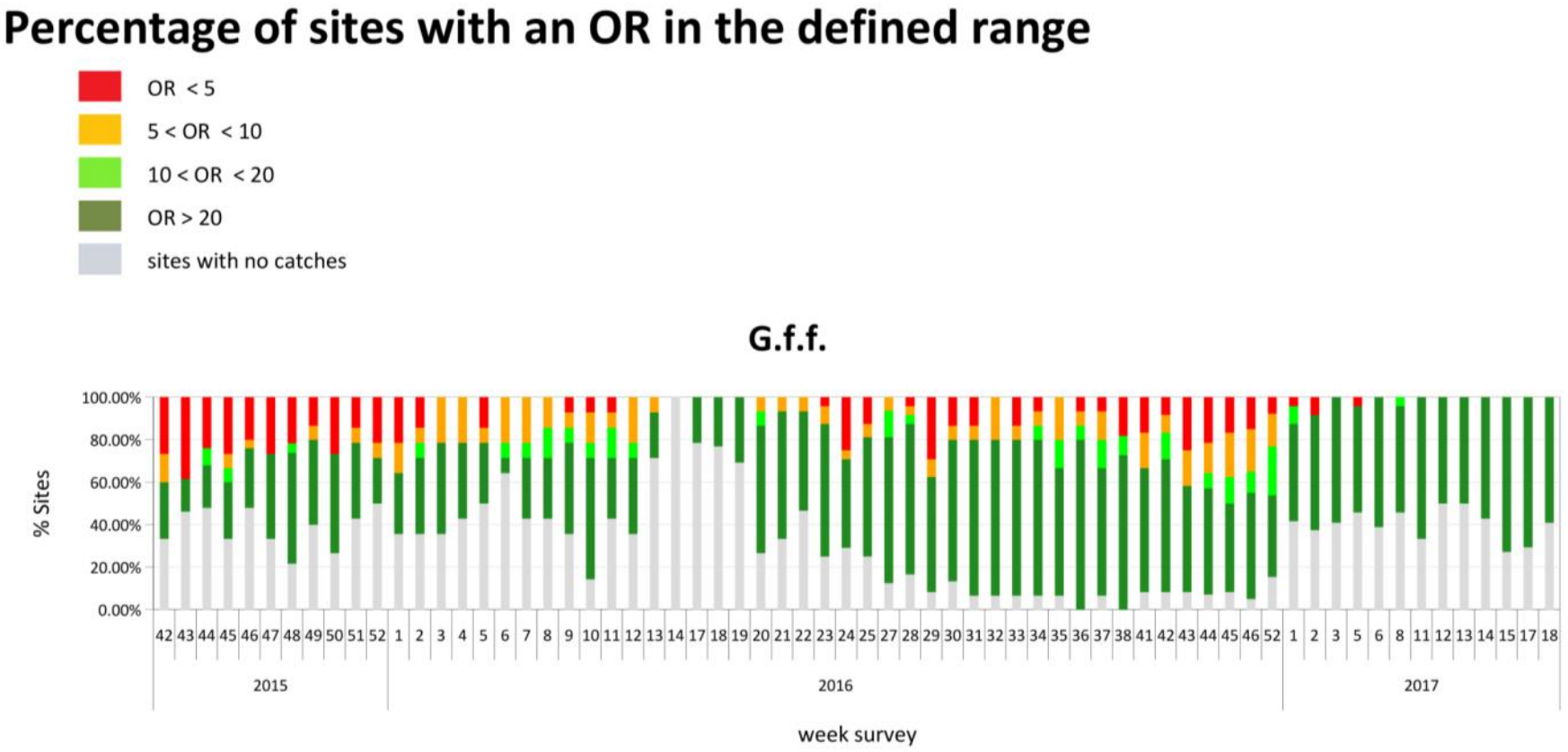


G. f. fuscipes (Week-18 2017)

- AD wild: 0.00 ftd
- AD Sterile: 0.07 ftd
- Over flooding ratio: 63/0

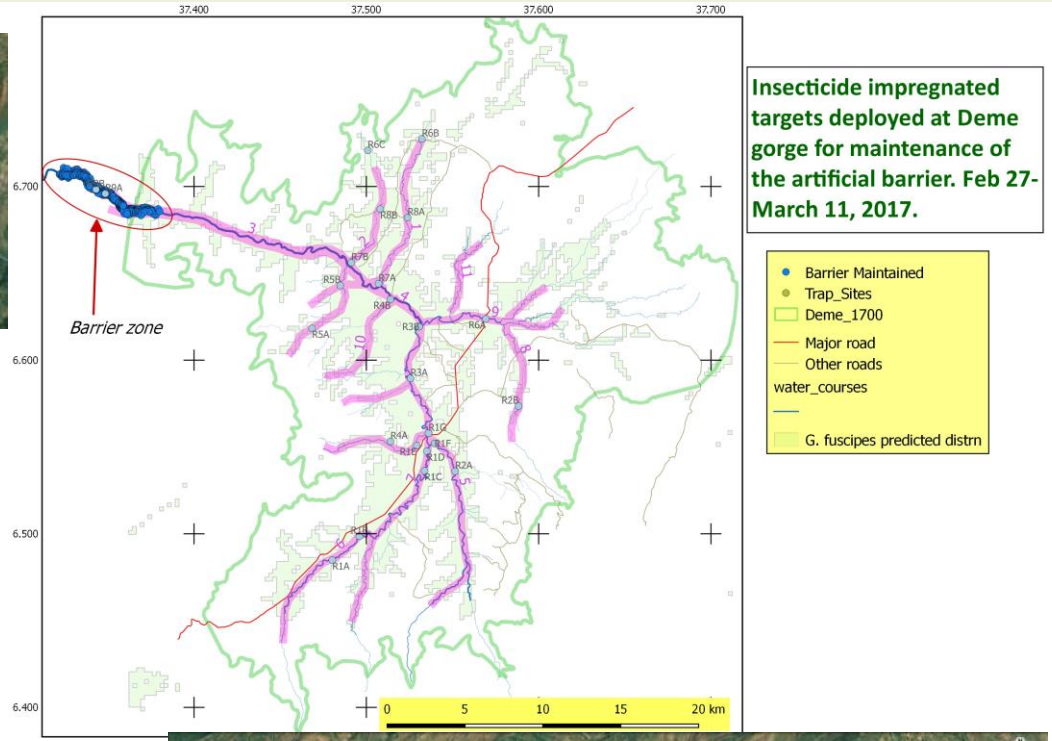
SIT field monitoring results

From: week 42 - 2015 (12/10/2015)
to: week 18 - 2017 (07/05/2017)



- **No wild fly for the last 4 weeks**
- **10 wild fly in the last 105 days in 98 traps (Apparent density= 0.0009 flies/trap/day)**

Re-invasion barrier



- Possible inlets evaluated
- Artificial barrier deployed (using ITT)
- Area monitored regularly
- Maintained every 4 month
- The challenge of topography

Drones for Sterile Tsetse Release

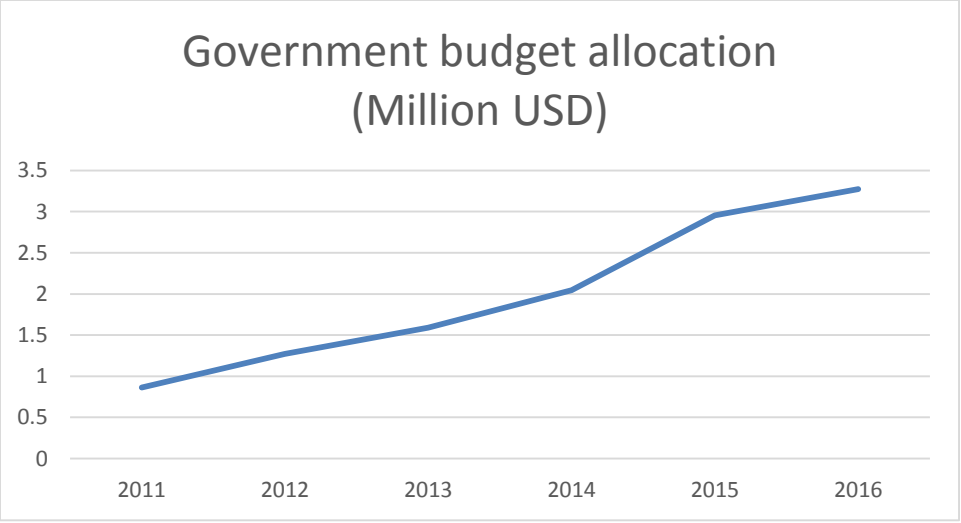
- Other means of releasing sterilized tsetse flies: Drones:
  - Less cost
  - Can fly in difficult topography
- Current situation of Ethiopia: Ready to get permit to import & operate

Achievements

- Because of the positive results intervention area expanded to the rest of the country even if eradication is not achieved
- Farmers got relief from the burden of T & T
- The control efforts alleviated the problem of T & T
    - Decrease in prevalence
    - Decrease in tsetse distribution & density
- Increase in livestock number and production
- Adaptive performance management system established

Achievements

- Commitment of the Ethiopian government (Budget allocation for T & T at national level: 2.8 Million Euro/year)
- High community mobilization & awareness creation
- Environmental risk assessment done for SAT and ground spray intervention



The major challenges

- Problem of sustaining the results achieved
- High demand from communities for T & T control
- High settlement in tsetse cleared areas (Land use policy not on the ground)
- No socio-economic impact assessments done after intervention
- No regulation in place for use of drones and other new technologies
- Topography difficult for ground & aerial operations
- Hot spot areas (National parks) & outlets in the fragmented tsetse belts
- Insufficient number of sterile males for release

Way forward

- Continue strengthening the project management and coordination
- Independent studies on socio-economic impact of the intervention
- Establishment & maintenance of strategic barrier sites
- Further commitment from the government and other agencies
- Use of better release technologies (DRONES)
- Strengthen central data management system
- National/regional atlas of T & T
- Problem oriented researches


Thank you!