NAMP OPERATIONS PLAN

APRIL 2025

Version 5.0

FOREWORD

This revised Operations Plan implements resolutions of Exercise Tiliqua (2021) which tested the governance and administration of the NAMP. A draft document was discussed by the Technical Committee at the 2022 Technical Committee Annual Meeting and reviewed by the Steering Committee in December 2022.

Further updates were agreed to at the 2023 NAMP Technical Committee Meeting in August 2023, and agreed to by the Steering Committee in November 2023.

The Operations Plan is an internal working document for distribution and reference within the Technical Committee. It should not be shared beyond the NAMP Technical Committee and Steering Committee without permission of the Program Manager and should not be made available as a public resource or as a guide to the operations of NAMP.

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Acronyms and definitions

ACDP	CSIRO Australian Centre for Disease Preparedness
AGID	Agar gel immunodiffusion test
AHA	Animal Health Australia
AHC	Animal Health Committee
AV	Akabane virus
BEFV	Bovine ephemeral fever virus
BENT	NAMP budget – entomology
BTV	Bluetongue virus
BVIR	NAMP budget – virus
CCEAD	Consultative Committee on Emergency Animal Diseases
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CVO	Chief Veterinary Officer
EHD	Epizootic haemorrhagic disease
ELISA	Enzyme-linked immunosorbent assay
LED	Light Emitting Diode
IATA	International Air Traffic Authority
NAHIS	National Animal Health Information System
NAMP	National Arbovirus Monitoring Program
NAMP-Info	NAMP Information System
NAQS	Northern Australia Quarantine Strategy
NLIS	National livestock identification system
PCR	Polymerase chain react test
VNT	Virus neutralisation test
WOAH	World Organisation for Animal Health
WOAH Code	WOAH Terrestrial Animal Health Code

NAMP processes and reporting

1 Introduction

1.1 Purpose of this Operations Plan

The NAMP Operations Plan is a technical and operational supplement to the Business Plan. It is maintained and utilised by the Program Manager in consultation with the Technical Committee. The target audience of the Operations Plan is the NAMP Technical and Steering Committees. The Operations Plan supports the delivery of the program's outputs and its effective day-to-day coordination and operability.

Details of virus and vector monitoring plans for each of the states and territories are held within then NAMP Information System (NAMP-Info) [1] through the 'NAMP budget – entomology' (BENT) and 'NAMP budget – virus' (BVIR) projects and are also considered to be a part of the Operations Plan.

The objectives, outputs and outcomes of NAMP, and its governance structures and supporting materials, are described within the annual Business Plan.

1.2 Planning and approvals

Agency Coordinators are responsible for identifying, enrolling and administering virus and vector monitoring sites within their jurisdiction.

The number and placement of virus and vector monitoring sites that will be active in each season, and the intensity of monitoring, are agreed upon during the annual meeting of the Technical Committee. At the Technical Committee's discretion, this may also reflect the outcomes of a monitoring strategy discussion (Section 0), which aims to ensure that the placement and intensity of monitoring at a national level is best aligned with a current and nationally focussed strategy. Ultimately, the intensity of monitoring at a national level will be a balance between the requirements of trading partners, Australia's understanding of the intent of the World Organisation for Animal Health (WOAH, formerly OIE) standards, and the expectations of NAMP's funding parties.

Agency Coordinators provide a summary of their preferred arrangements for virus and vector monitoring to the Program Manager prior to the annual meeting of the Technical Committee. This will include the number and placement of sentinel and serosurveillance herds and vector monitoring sites. Once agreed upon by the Technical Committee, details of virus and vector monitoring will be uploaded to the BENT and BVIR projects of NAMP-Info. The cost basis underpinning budget calculations will be provided within the current Business Plan. Ethics approvals for all monitoring activities are the responsibility of the individual states and territories and should be enacted under the relevant state and territory legislation.

1.3 Data management

NAMP partners are provided with access to otherwise confidential documents and data through the password protected NAMP-Info. The NAMP-Info is managed by Animal Health Australia, with technical

[1] See: https://namp.animalhealthaustralia.com.au/public.php?page=pub_home&program=2

assistance provided by an external contractor. Agency Coordinators submit monitoring data to NAMP-Info, as well as their quarterly and annual reports. Requests for data access, analysis or modifications should be directed to the Program Manager.

Information available within NAMP-Info includes:

- Summary reports, such as budgets, entomology, serology, virus isolations, etc.
- Interactive map that has the layers available to the public, as well as the outcomes of serology and vector trapping. Like the public map, a legend can be requested. The map can also be downloaded in PNG format.
- Project summary and detailed data, including the monitoring plan and outcomes.

There is also linked access to the NAMP Wiki, which includes progress reports, quarterly and annual coordinator reports, program plans, information about changes to the BTV zone map (including templates, and the outcomes of past BTV zone map change proposals), a *Culicoides* key, a Wiki User Manual and the Data Contributor Manual.

2 Business cycle and reporting

An overview of key milestones within the annual NAMP business cycle is given in Table 1.

Most of the activities within the cycle take place during the winter months when arbovirus activity is at its lowest. The schedule also ensures coordination with the production of the *Animal Health in Australia Annual Report*. Quarterly data entry and reporting to Animal Health Australia take place in August, November, February and May. The Annual Report is prepared in draft form in November/December and is finalised in January/February.

Table 1 NAMP annual business cycle (August to August)

Description	Who	Scheduled Finish
Quarter 4 (April to June) data entry into NAMP-Info Quarterly reports to AHA	State and Territory Coordinators	1st week August
Check data, follow up outstanding quarterly reports and invite quarterly invoices to AHA	Surveillance Coordinator	2nd week August
Prepare for annual meeting: • Coordinate meeting papers and agenda • Coordinate site reconciliation from the closing season • Request draft monitoring plans (upcoming arbovirus season) and update NAMP-Info • Check draft monitoring budget • Check Activity Summary (financial year completed) is accurate • Request Annual Report from State and Territory Coordinators (with commentary on under/over activity >10%) • Draft the Management Report for Technical Committee input during the annual meeting)	Surveillance Coordinator and Program Manager	1st and 2nd week August
Annual Technical Committee Meeting	Technical Committee	4th week August
Finalise Management Report to Steering Committee Prepare draft Business Plan Finalise meeting papers for Steering Committee meeting	Program Manager	1st week October
Quarter 1 (July to September) data entry into NAMP-Info Quarterly reports to AHA	State and Territory Coordinators	1st week November
Check data, follow up any outstanding quarterly reports and invite quarterly invoices to AHA	Surveillance Coordinator	2nd week November
Annual Steering Committee Meeting support for the Business Plan for upcoming financial year	Steering Committee	4th week November
Annual Report preparation commences	Program Manager, Surveillance Coordinator and Technical Committee	November to December
AHC paper, if required	Program Manager	November to December
Propose program budget for AHA (following financial year)	Program Manager	1st week December

Description	Who	Scheduled Finish
Teleconference to review BTV Transmission Zone boundary if required	Technical Committee	1st week December
Annual Report ready for publishing	Program Manager	3rd week December
Quarter 2 (October to December) data entry into NAMP-Info Quarterly reports to AHA	State and Territory Coordinators	1st week February
Check data, follow up outstanding quarterly reports and invite quarterly invoices to AHA	Surveillance Coordinator	2nd week February
OOS approval of Business Plan for upcoming financial year	Steering Committee	May
AHA Annual General Meeting NAMP budget finalised	Program Manager	June
Quarter 3 (January to March) data entry into NAMP-Info Quarterly reports to AHA	State and Territory Coordinators	1st week May
Request to State and Territory Coordinators about the provision of budgeted sites for the upcoming financial year	Surveillance Coordinator	2nd week May, with 4 weeks for response
Check data, follow up outstanding quarterly reports and invite quarterly invoices to AHA	Surveillance Coordinator	2nd week May

3 Monitoring strategy

3.1 Objectives and topics

As part of the Technical Committee's annual meeting, a formal discussion is included to develop/review the national monitoring strategy. The overarching intent of the process is to encourage the Technical Committee members to review NAMP's positioning, configuration and risks from a national standpoint. This builds on the plans and perspectives of the individual agencies and should not be a replacement or alternative to the existing process. From time to time a more in-depth half day discussion may be required to workshop the monitoring strategy. This may be facilitated by the Technical Committee Chair (Program Manager), or by an external facilitator.

It is expected that current events will shape the monitoring strategy workshop, although steps should be taken to ensure that discussion is sufficiently broad as to encompass consideration of all relevant aspects of the configuration of NAMP – as well as any ongoing technical developments or difficulties. Some of the topics that may be important to cover in the monitoring strategy workshop include:

- Requirements of current trading partners, and for access to new markets
- Important changes in the distribution of NAMP viruses and their vectors
- New information about the competency of Australian vectors
- Inclusion of other arboviruses, such as epizootic haemorrhagic disease (EHD) or Schmallenberg viruses, or members of the Simbu group (including Aino, Douglas, Peaton and Tinaroo viruses)
- Criteria and protocols for the follow-up of routine and non-routine detections
- Feedback and changing views about the response to detections of BTV from outside NAMP
- Relative emphasis on serosurveillance and sentinel herds for the detection of changes in the distribution of endemic BTV, AV and BEFV
- Specifying the number and location (by state and territory, or more specifically) of sentinel herds, serosurveillance herds and vector monitoring sites
- Other technical considerations, such as the enrolment criteria for animals within serosurveillance herds or the width of the border between the BTV Transmission Zone and the Buffer Area.

The discussion about current and future market access, should be informed as far as possible by the annual report from the representative from the Animal Biosecurity Division, Department of Agriculture, Fisheries and Forestry.

Discussion about important changes in the distribution of NAMP viruses and their vectors, or new information about the competency of Australian vectors, will be informed by the Technical Committee's Scientific Advisors in virology and entomology.

Discussion about viruses other than BTV, AV and BEFV should focus on technical and operational considerations, with matters of the positioning of NAMP as a program left to the Steering Committee. In this area, guidance may be provided to the Technical Committee by the Steering Committee representative. Considerations may encompass the benefit of advance planning about surveillance for EHD virus (EHDV), as this is now listed by WOAH and may be included in the conditions required by some trading

partners. The discussion may also extend to ongoing evidence as to the benefits that may be gained from testing for Simbu group viruses as a more sensitive indicator of exposure to *Culicoides* than testing for BTV. The Technical Committee may also wish to discuss the format for reporting (internal only) against viruses other than BTV, AV and BEFV.

The protocols for responding to routine and non-routine detections of BTV from NAMP surveillance are given in Sections 7.1 and 7.2, respectively. The suitability of these should be reviewed on a regular basis, to take account of developments in laboratory diagnostics and the epidemiology of BTV. The response to detections of BTV from outside NAMP is outlined in Section 7.3 of this Operations Plan and should be reviewed on a regular basis to ensure that any process, administration or communications issues are addressed. It will also be important to ensure that any changes in understanding of the epidemiology of BTV in Australia are carried through to the protocol for response to detections outside NAMP (Appendix I).

Although sentinel herds continue to be the primary form of surveillance under NAMP, they require greater cost and administrative oversight and are not always a practical or efficient proposition in areas characterised by extensive broadacre grazing. There is also an ongoing challenge to identifying producers willing to establish and maintain sentinel herds according to NAMP specifications. For these reasons, serosurveillance herds may in some circumstances provide an attractive alternative. The common challenges with serosurveillance herds include the difficulty in obtaining a high level of confidence in the exposure history of individual animals and the difficulty in undertaking follow-up of individual positive results. These challenges notwithstanding, serosurveillance herds currently provide an important means by which to fill identified gaps within the sentinel surveillance network or to guide the positioning of new sentinel herds. Whether the role of serosurveillance herds should extend beyond this, and the circumstances or locations where this will be appropriate, should be reviewed by the Technical Committee during the monitoring strategy discussion.

Following from reinforcement of the role of sentinel and serosurveillance herds the Technical Committee should consider the strategy underpinning the number and location (by state and territory, and by zone) of sentinel herds, serosurveillance herds and vector monitoring sites. There are no rules within NAMP that dictate how this strategy should be developed, or the eventual number and location of sentinel herds, serosurveillance herds and vector monitoring sites. Likewise, there is not a requirement for NAMP surveillance of viruses or vectors to satisfy statistical imperatives. Quantitative methods can be used to evaluate a chosen strategy (or to compare strategies) if this is thought likely to improve the outcomes. Alternatively, the Technical Committee may consider it preferable to undertake a systematic but essentially qualitative appraisal of the spatial arrangement and intensity of activities at a national level, to determine whether the monitoring plans put forward by individual states and territories are likely to provide the most efficient and effective approach. Whether a quantitative or qualitative process is followed, the objective of this part of the monitoring strategy discussion should be to provide the Technical Committee with an opportunity to consider the monitoring plans of individual agencies in the context of a national strategy.

Other matters concerned with the configuration of NAMP can be suggested by individual members of the Technical Committee (in communication with the Program Manager), who will then provide the necessary briefing materials and lead those discussions. Matters for discussion may also be put forward by the Steering Committee.

3.2 Assessment and treatment of risks to NAMP

The monitoring strategy workshop should include the assessment and treatment of technical and operational risks to the program. The risks obtained from this exercise may then be included in the NAMP Risk Register (see NAMP Business Plan) managed by the Steering Committee. At the discretion of the Steering Committee, the risks assessed and treated by the Technical Committee may inform the discussion of program risks that is included with the annual Business Plan.

Risk management should commence with a review of the register compiled by the Technical Committee during the previous monitoring strategy workshop. Some risks may be resolved and can be marked as closed. Risks that are retained should be reassessed and treated, including ratings for consequences and likelihood, the identification and evaluation of risk treatments and the estimation of residual risks. Treatments, including action plans and an indicative schedule for implementation, should be assigned to designated members of the Technical Committee.

Monitoring viruses and vectors

4 Sentinel herds

4.1 Selection and identification of sentinel animals

To be eligible for recruitment to a sentinel herd, animals must be seronegative and reliably identified.

Animals should be old enough at recruitment to be free of maternal antibodies[2] and young enough to have had limited exposure to arboviruses.

All sentinel animals should be identified in at least two ways. Ideally, this will include a NAMP tag and either a herd management tag or an NLIS tag or device.

Typically, it is recommended that 12-to-15 animals be bled on the recruitment bleed to ensure that 10 are maintained through the season. Note in some northern regions additional animals may need to be bled on the recruitment bleed to ensure enough seronegative animals are recruited.

4.2 Sample identification and handling

To ensure that the test results obtained from sentinel herds can be verified and followed up with confidence, the following must be adhered to:

- Animal identification (NAMP tag number, and ideally either the management tag number or the NLIS number) and tube number must be carefully matched during sample collection.
- Tubes from different herds must be segregated prior to packaging. If there is duplication of numbers between herds, other unique, practical identifiers must be used.
- Sample submission forms must clearly identify those individual animals that have been bled and the corresponding sample identity.
- On receipt at the laboratory, submission forms must be reconciled with accompanying samples and any discrepancy recorded immediately. Submissions of different origins must be kept separate.
- Prior to transfer or testing, the original submitted sample must be labelled with the laboratory accession number or assigned a unique identification.
- If being transferred, the original and the recipient containers must be carefully matched from a list that shows both.
- Worksheets for testing must be cross-checked for each sample being dispensed for testing.

4.3 Laboratory response time

Serological tests for routine surveillance may be batched to keep costs to a minimum, at the discretion of the testing laboratory. Shorter response times may occur in jurisdictions with fewer sentinel or serosurveillance herds and may be as short as several days.

[2] Variation in the age of maternal antibody freedom, with presence up to 9 months of age, is possible. Estimating the age of maternal antibody presence should be based on each respective states' professional judgement, as it is not an exact science.

- Isolates for genotyping and serotyping are processed by ACDP as directed by the submitter. Response time can be negotiated with the Program Manager to be commensurate with the use of the result.
- Isolates for genotyping are usually batched by the jurisdiction and submitted towards the end of the transmission season. The time between isolation genotyping will thus be variable. This processing is not considered urgent (Category 1, agreed Animal Health Committee (AHC) protocol).

ACDP will type the antibodies in sera that have reacted in the C-ELISA wherever there is a concern, or a possibility, that a BTV serotype other than 1 or 21 may have been transmitted in an area where such a serotype would not usually occur. This processing is not generally considered urgent.

The results of laboratory testing should be uploaded to NAMP-Info within 6 weeks of the end of the quarter in which the samples were tested. This schedule is required for Quarterly Reports to the Steering Committee and is timed to coincide with reporting to NAHIS. Where a monitoring result results in a change to the existing transmission zone, it should be uploaded as soon practicably possible following the verification of the result to enable updates to the BTV transmission zone map.

4.4 Schedule for sample collection from sentinel herds

The first sampling of sentinel animals should coincide with the time when virus transmission may first occur. In areas where there is known virus transmission, newly recruited sentinels should be free of (or should soon be free of) maternally derived antibodies at the recruitment sampling.

Further sampling is then timed to reliably detect virus activity throughout the season. The frequency of sampling will depend on the purpose of the monitoring, with more frequent collections during likely times of vector activity, which typically is from December to May in southern parts of Australia

Ideally, samples should be collected:

- Weekly in a herd that is used to detect virus incursions
- Monthly in areas of intensive virus transmission
- Quarterly or twice per year in free areas or at times regarded as vector free.

4.5 Clinical disease

NAMP monitors the distribution of transmission and occurrence of specific arboviruses and their vectors by testing animals in sentinel and serosurveillance herds and insect trapping. NAMP does not monitor or report clinical disease.

The Technical Committee may provide scientific advice on an ad hoc basis to CVOs on livestock arbovirus matters in support of the objectives of the NAMP. The Technical Committee will not be involved in any decision making, nor be bound or obliged to provide anything more than a scientific opinion for the consideration of the CVO. Decisions taken by CVO's, following advice provided by the NAMP Technical Committee, rest with the CVO and are not attributed to the NAMP.

Response to clinical disease and national decision-making arrangements are outside of the scope of the NAMP and are described in the relevant AUSVETPLAN manuals,[3] including the Disease Strategy for Bluetongue and the Management Manual - Control Centres Part 1.

Diagnostic laboratory case data may be used by state and territory governments to supplement NAMP data for publishing annual virus distribution maps in the annual NAMP report (e.g., BEF cases).

[3] Informing EAD Responses - AUSVETPLAN - Animal Health Australia; https://animalhealthaustralia.com.au/ausvetplan/

5 Serosurveillance herds

5.1 Selection and identification of animals

Animals enrolled to a serosurveillance herd should be old enough to be free of maternal antibodies[4] and young enough to have had limited exposure to arboviruses. Typically, ~30 animals are bled in a serosurvey bleed.

Animals should be identified in at least two ways One of these ways should be an NLIS tag, or a herd management tag as a minimum. Additional methods of identification are shown in Table 2.

Animals must have been born on, and not moved from, the serosurveillance property.

Table 2 Identification methods with weighting preference

Identification method	Weight
DNA test results consistent with rest of herd.	3
Property records indicating animal has not left the property during its lifetime. For example, continuous records of individuals or groups moving between paddocks but not off the property, OR, records are available to show all animals are individually identified and list those moving on and off the property.	2
An animal has been entered on the NLIS database for 12 months or more and the database shows no movement of individual animals off the property	1
Property brand (healed) as the sole brand on the animal and consistent with rest of the herd.	1
Breed (phenotype) consistent with the rest of the herd.	1
Statutory declaration (pro-forma to be supplied) from the owner/manager that to the best of their knowledge, the animal was born on the property and has not left the property during its lifetime.	1

5.2 Schedule for sample collection from serosurveillance herds

In contrast to sentinel herds, which are sampled at least twice annually (Section 4.4), serosurveillance is a single sampling event at a time when the cattle are being mustered for normal operations.

[4] Variation in the age of maternal antibody freedom, with presence up to 9 months of age, is possible. Estimating the age of maternal antibody presence should be based on each respective states' professional judgement, as it is not an exact science.

6 Monitoring vectors

6.1 Introduction

NAMP monitors species of biting midge from the genus *Culicoides*. These are collected using light-traps. Studies made in 2002-2004 (Bishop *et al*., 2006)[5] have shown that greater efficiency can be achieved in marginal areas using light traps with green light emitting diodes (LEDs) instead of incandescent globes. Green LEDs were adopted as the Australian standard and should now be used in all light traps nationwide.

In order of their priority to NAMP, the objectives of vector monitoring are to:

- Detect introductions of exotic species of *Culicoides*
- Assist in the definition of the BTV Transmission Zone and the BTV Transmission-Free Zone, to facilitate the export of livestock
- Identify and understand the distribution and ecology of *Culicoides* that act as vectors of BTV, AV (other Simbu group viruses) and, to a minor extent, BEFV[6]
- Predict the movements of *Culicoides* and, thus, viral transmission
- Record native species of *Culicoides* and consider their potential as vectors of virus affecting livestock and the native fauna.

6.2 Timing and frequency of trapping

Culicoides should be monitored monthly, and according to a schedule that will vary with the placement of the trap. The Technical Committee and Reference Entomologist discuss the monitoring schedule, and the northern/southern boundary for vector monitoring purposes, at their meeting each year. For guidance, the below trapping frequency is recommended:

- BTV Transmission Zone and northern Australia – year-round (12 collections)
- BTV Transmission Zone south of northern Australia, to the boundary of the Buffer Area – December to May (six collections)
- Higher risk[7] areas of in northern Australia outside of the BTV Transmission Zone where there have historically been large numbers of animal movements between zones – year-round (12 collections)
- BTV Transmission-Free Zone in southern Australia – January to April (four collections)

[5] Bishop A, Bellis G, McKenzie H, Spohr L, Worrall R, Harris A and Melville L (2006) Light trapping of biting midges *Culicoides* spp. (Diptera: Ceratopogonidae) with green light-emitting diodes. Australian Journal of Entomology 45(3): 202-205

[6] Noting that the primary vector for BEFV in Australia is the mosquito *Culex annulirostris*

[7] Information about vector presence in these areas is important to better understand the risk of BTV transmission, therefore, higher risk northern sites should have increased testing to support the early detection of any novel incursions. Other northern areas determined to be of lower risk should operate on six collections per year.

Moonlight adversely affects light-trap catches, and monitoring should not be undertaken during the week of the full moon.[8] Trapping on cold, windy or rainy nights should also be avoided. At each monitoring event, the trap should be set before dusk and placed near areas with high animal traffic, such as where animals sleep at night, and should remain in the field for no more than two nights. Third party light trap operators (co-operators) should be provided with a calendar covering the appropriate monitoring period and highlighting both the lunar cycle and the week during which trap monitoring should occur.

Each co-operator will receive one complete light trap. Enough consumables for the duration of the sampling period, including batteries, bottles, pre-paid envelopes, packaging materials and preservative such as ethanol or propylene glycol, are supplied to co-operators prior to the start of the sampling season.

An example of trap operator instructions (including the text for an introductory letter to co-operators), and supplies, are given in Appendix II.

6.3 Trap processing

State and Territory Coordinators (or their delegates) should follow the instructions below when processing trap catches:

- Samples returned to the coordinator are recorded using the routine management system used by the respective laboratory.
- If processing samples from both the BTV Transmission Zone and BTV-Transmission-Free zone, the samples from the BTV-free zone should be processed first to minimise the risk of cross-contamination.
- *Culicoides* are separated from other insects under a binocular microscope in the laboratory.
- *Culicoides* are identified to species by their wing patterns and other characters, counted, numbers recorded, and records retained.
- For collections containing more than 500 specimens, approximately 500 specimens are sorted to species and counted while the remainder of the collection is screened to ensure no other species are present. The results from the sample of 500 are then extrapolated to provide an estimate of the entire collection.
- Where practical, the sex and the parous stages of females are determined and recorded.
- Identifications can be confirmed by Reference Entomologist. A key to assist with identifying female specimens has been developed and will be accessible on the Animal Health Australia website in 2025.
- Samples of *Culicoides* are either discarded or are transferred to 70-100% alcohol in 5 ml plastic tubes with screw caps and these stored in foam tube holders labelled by location and year (if required for testing in the future).
- Data are to be entered on NAMP-Info before the end of the quarter.

[8] Information on phases of the moon is available from: http://www.moonphases.info/moon_phases.html

6.4 Sample handling and packing

Best practice is to follow the protocol outlined below when submitting samples to an approved (NAMP) laboratory. Note if samples need to be sent via air freight and they are in ethanol the specimen bags must be heat sealed and relevant IATA protocols followed. Insect samples stored in ethanol that are not heat sealed must be sent by road transport only and sent in plain packaging (that is, without IATA labelling on the outer pack and no dangerous goods declaration). Propylene glycol can be used as a substitute for ethanol and is not subject to strict transport requirements.

1. After removing the bottle from the trap, screw the lid on the trap bottle and gently invert and mix the contents (Note: the same trap bottle is used for two consecutive nights and some ethanol evaporation usually occurs – if more than 20% liquid has been lost, check and please top up).
2. Roughly divide the 'ethanol and insects' mixture from the NAMP trap bottle into a number of 30-40ml specimen containers. The objective is to have roughly 30mls of liquid in each container. The total volume of ethanol (or can be substituted for propylene glycol) per bottle must not exceed 30mls. Divide the insects approximately evenly between the bottles. Specimen containers and specimen bags can be obtained from the state or territory veterinary laboratories.
3. Label and pack the filled specimen containers into the snap lock specimen bag(s). Record the date, trap site, etc on each bottle. Excessive air should be excluded from all snap lock bags before sealing them to reduce bulk before packing.
4. Pack the bagged NAMP trap contents and specimen containers into the large snap lock bag together with enough absorbent material (absorbent paper, cotton wool, etc) to absorb 100mls of liquid then seal the bag.

6.5 Servicing traps

Light traps should be returned for cleaning every 2 years. This will include the following service items:

- Traps should be dismantled and washed in 70% alcohol
- Screws should be checked and tightened if necessary
- Propeller and motor operation should be checked and adjusted if necessary
- Photocell and electronics should be checked, and re-standardised if necessary
- All bottles should be cleaned thoroughly and checked to prevent any contamination of future samples.

Responding to the detection of target and non-target viruses and vectors

7 Responding to positive BTV test results

A positive BTV test result obtained from **NAMP surveillance activities** (that is, from a sentinel herd or a serosurveillance herd) within the BTV Transmission Zone, and outside the Buffer Area, and not a novel or unexpected strain, should be verified and uploaded to NAMP-Info. The upload of this data should occur as soon as it is verified through the process for routine BTV detections outlined in Section 7.1 below.

Other positive BTV results obtained from NAMP surveillance activities should be classified as either **routine** or **non-routine** and should be followed up according to the protocols in Sections 7.1 and 7.2, respectively.

- A **routine** BTV result (Section 7.1) is one obtained from a herd located within the Buffer Area, or within the BTV Transmission-Free Zone but close[9] to its border with the Buffer Area.
- A **non-routine** BTV result (Section 7.2) is one obtained from substantially within the BTV Transmission-Free Zone (that is, more than 100 km from the border with the Buffer Area) and for which there is no climatic or other evidence to support the movement of vectors and virus to this location. The detection of a novel or unexpected strain of BTV would also be classified as non-routine.

7.1 Routine detections of BTV (NAMP surveillance)

As a preliminary process, the ordered sequence of steps outlined below should be followed for routine detections:

1. Check test results

a) Check the quality control parameters for the test for which the positive result has been obtained

b) Ensure the sample replicates exhibit acceptable reproducibility, and that the test result is clearly positive

c) Confirm that the results listed in the laboratory report match the test worksheets

d) Check whether other positive samples were included in the same test batch.

2. Check sample identification

a) Check the identification of the positive sample, and the corresponding animal identification on the specimen submission documents

b) Check the animal identification on the original sample tube against the information included on specimen submission documents

c) In the case of sentinel animals, confirm that the positive animal has been tested previously with negative results.

[9] A distance of 100km may be used for classification of expected non-routine BTV detections from NAMP surveillance

3. Check animal status

a) Sentinel herds

I. Request a check of the identification of all animals, especially the positive

II. Confirm that the positive animal has remained on the property throughout the monitoring period.

b) Serosurveillance herds

I. Confirm that the positive animal(s) meets the criteria outlined in Section 5.1 and has not left the property at any time

II. If possible, request additional sampling to be conducted on the affected and perhaps neighbouring properties (not essential for confirmation of positive).

Having verified the test result and animal identification, additional testing may be used to clarify and confirm the status of the sentinel or serosurveillance herd from which the positive result(s) was obtained. The protocol followed may vary to an extent with the location of the herd and its history. The following should be used as a guide:

Additional testing for the clarification of routine BTV results:

a) Retesting

- Sentinel herds: retest the positive sample and the immediately preceding sample
- Serosurveillance herds: retest the positive sample and either all or a sample of the negative samples

b) Clarify serogroup: retest the positive sample(s) other serogroup-specific tests for BTV – that is, other BTV ELISA, BTV AGID

c) Clarify serotype: BTV VNT or other appropriate serological or molecular methods should be used to identify the serotypes that have been detected in Australia.

Sufficient whole blood from the positive animal(s) should be stored appropriately for possible later pathogenicity testing (virus transmission studies) or other purposes.

Positive samples can also be submitted to ACDP for independent testing. ACDP processes all NAMP samples labelled as urgent or high priority according to agreed AHC guidelines (AHC08 OOS15):

- If a Chief Veterinary Officer (CVO) designates a submission as Category 3 (high suspicion of an emergency animal disease event), ACDP will begin processing the submission as soon as it is received, on any day of the year
- If a submission is designated Category 2 (low likelihood of presence of an emergency animal disease or a less urgent rule out of an exotic incursion), processing starts on the next working day after receipt.

Assistance with further characterisation of isolated viruses is managed through the ACDP Coordinator whose specific responsibilities and reporting relationships are described in the NAMP Business Plan.

Having clarified the status of individual animals, the status of the sentinel or serosurveillance herd can be determined by applying the following rules:

- If all the tested animals are conclusively negative, then the sentinel or serosurveillance herd will be considered negative.
- If at least one tested animal is positive, then the sentinel or serosurveillance herd will be considered positive.

If the herd is considered to be negative, then no further action will be required. If the herd is considered to be positive, a reactive zone change proposal should be submitted to the Program Manager (Section 9.3).

Upon completion of the follow-up of a routine detection from a NAMP sentinel or serosurveillance herd, a summary of the situation, the additional testing and other activities undertaken, and the conclusions, should be provided to all relevant parties via the zone change proposal.

7.2 Non-routine detections of BTV (NAMP surveillance)

A non-routine detection of BTV is one for which there is no climatic or other evidence to support the movement of vectors and virus to a given location substantially outside the BTV Transmission Zone and Buffer Area. The detection of a novel or unexpected strain of BTV will also be classified as non-routine and will require notification to the Technical Committee via the Program Manager.

Determination of local transmission

The objectives of the response will be to clarify the status of the affected sentinel or serosurveillance herd and, if likely to be a true positive, to determine whether local transmission is occurring at that site. A reactive zone change proposal will only be submitted when it is clear that a new (unexpected) focus of BTV transmission has been established.

Note that in this context this context, demonstration of local transmission of BTV should include laboratory evidence and/or epidemiological argument in support of the temporal progression of exposure, infection and subsequent transmission of the virus within the herd and/or between herds within a local area. It is recommended that a vector be identified, and the activity of this vector within the local area should coincide with the putative exposure of test-positive animals. The dimensions of a local area will vary with the typical size of properties and stocking rate, but in many parts of Australia could be approximated by a local government area (LGA).

As a preliminary step, the following checks should be made (adhering to the guidance provided for routine detections in Section 7.1).

- Check test results
- Check sample identification
- Check the animal status.

Having verified the test result and animal identification, the serogroup and serotype should be established using the guidelines set out for routine BTV detections (Section 7.1).

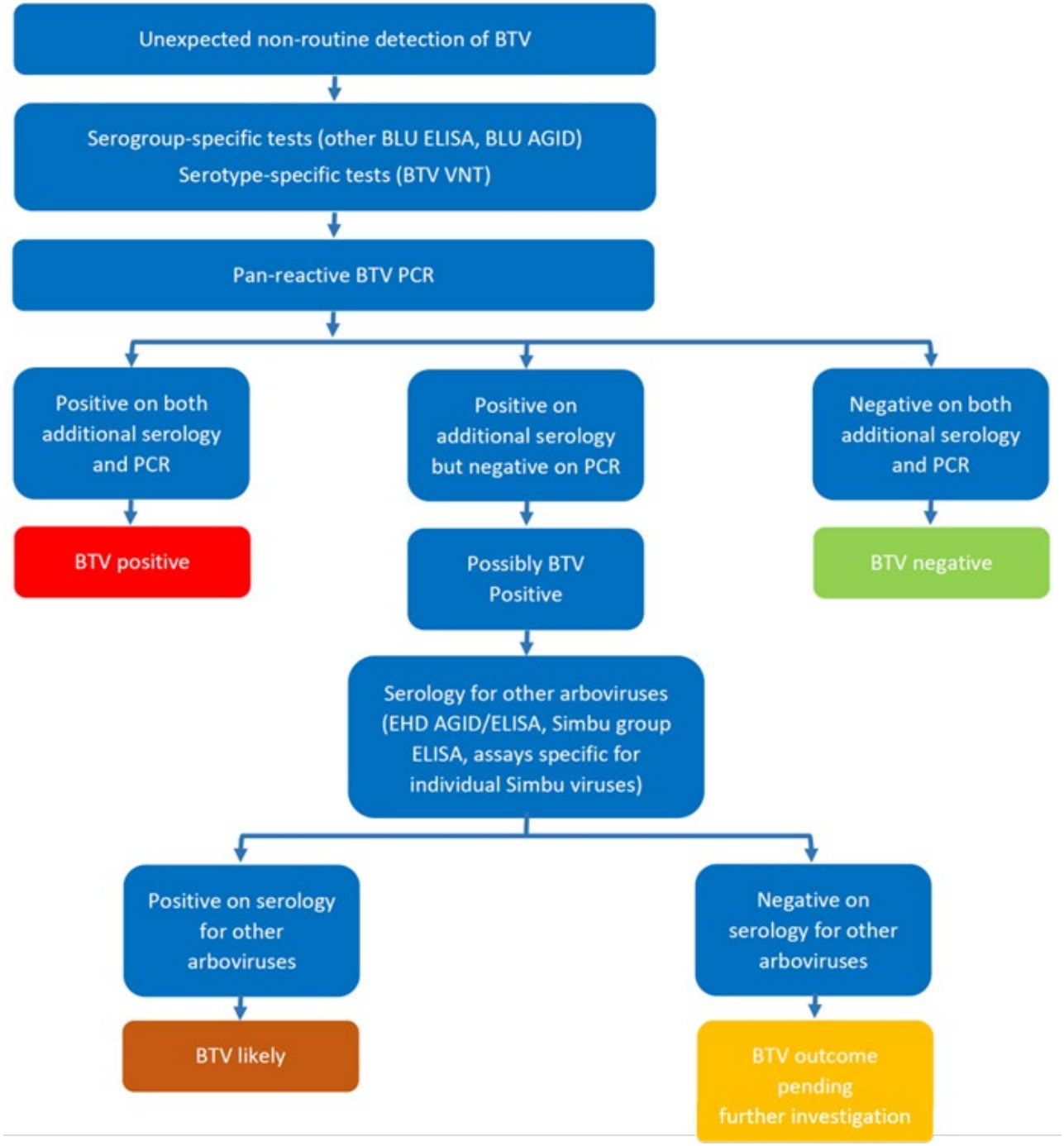
A pictorial representation of this approach to clarification of testing is given in Figure 1.

Non-routine positive BTV results should also be evaluated using a pan-reactive PCR. Where the original result was supported by additional serology (above), but was not supported by pan-reactive PCR, and

where competent *Culicoides* vectors have not previously been detected in the area, a selection of tests for other arboviruses (for example, EHD AGID/ELISA, Simbu group ELISA, assays specific for individual Simbu viruses) should be used to investigate *Culicoides* activity.[10]

A pictorial representation of this approach to clarification of testing is given in Figure 1.

Figure 1 Clarification of testing associated with non-routine detections of BTV from NAMP surveillance



[10] Note that the Simbu group ELISA is more appropriate than testing for AV antibodies in the first instance, as AV may not be the predominant Simbu group virus being transmitted in any given season.

Positive samples should also be submitted to ACDP for independent testing. ACDP processes all NAMP samples labelled as urgent or high priority according to agreed AHC guidelines (AHC08 OOS15):

- If a CVO designates a submission as Category 3 (high suspicion of an emergency animal disease event), ACDP will begin processing the submission as soon as it is received, on any day of the year
- If a submission is designated Category 2 (low likelihood of presence of an emergency animal disease or a less urgent rule out of an exotic incursion), processing starts on the next working day after receipt.

Assistance with further characterisation of isolated viruses is managed through the ACDP Coordinator whose specific responsibilities and reporting relationships are described in the NAMP Business Plan.

Having clarified the status of individual animals, the status of the sentinel or serosurveillance herd may be guided by the following:

- If all the tested animals are conclusively negative, then the sentinel or serosurveillance herd will be considered negative and no further action will be required.
- If at least one tested animal is BTV positive, BTV likely or BTV outcome pending further investigation (Figure 1), then the sentinel or serosurveillance herd will be considered provisionally positive and will be evaluated to determine if there is local transmission.

Provisionally positive herds (above) should be evaluated carefully to establish possible pathways for the movement of the virus to that area. The evaluations will be undertaken by the State or Territory Coordinator(s), under the jurisdiction of the relevant CVO(s) and the guidance of the Technical Committee. Collections of insects should be undertaken to identify the vector(s) likely to be implicated in local transmission. Additional sentinel herds may be warranted to help clarify the extent of local transmission.

If these evaluations lead the Technical Committee to conclude that local transmission (as defined above) is occurring, then a reactive zone change proposal should be submitted (Section 9.3).

This will also require the notification of the Technical Committee through the Program Manager, and may lead to an out of session meeting.

If the status of the herd and the epidemiology of the event remain uncertain, the Technical Committee may decide to continue surveillance within the area and to continue to retest individual animals.

Upon completion of the follow-up of a non-routine detection from a NAMP sentinel or serosurveillance herd, a summary of the situation, the additional testing and other activities undertaken, and the conclusions, should be provided by the State or Territory Coordinator to the following:

a) Program Manager

b) State or territory CVO

c) Australian Government Department of Agriculture, Fisheries and Forestry representative to the Technical Committee.

7.3 Detections of BTV from outside NAMP surveillance

A positive BTV test result obtained from **outside NAMP surveillance activities** (for example, from pre-export testing, from research activities or from an animal health investigation) will not impact directly on NAMP zones. This is because NAMP zones reflect the confidence gained from Australia's long-standing and formal program of surveillance and monitoring for BTV, and the monitoring strategy that underpins it.

The resolution of the unexpected result, detected outside of NAMP surveillance activities, is the responsibility of the jurisdiction.

Where a BTV test result has been obtained from an animal that is believed to reside within a herd located in the BTV Transmission-Free Zone and has not resided within, or travelled through, the BTV Transmission Zone or Buffer Area, then the CVO may choose to submit to the Technical Committee (through their State or Territory Coordinator) a proposal to enhance or alter NAMP surveillance activities within the local area.[11] This proposal may include a request for the establishment of a new sentinel herd(s) or serosurveillance herd(s) or the establishment of new vector monitoring sites.

Before submitting this proposal to the Technical Committee, or following up the detection with additional testing, state or territory animal health staff are encouraged to consider the protocol provided in Appendix 1. This protocol provides guidance to help clarify the status of both individual animals and the herd and includes recommendations about investigating the epidemiology of the incident.

7.4 Detections of arboviruses other than BTV (NAMP surveillance)

The following steps should be followed (in sequence) when an arbovirus other than BTV is identified serologically or virologically (in any location) in either a sentinel or a serosurveillance animal.

1. Check test results

a) Check the quality control parameters for the test for which the positive result has been obtained

b) Ensure the sample replicates exhibit acceptable reproducibility, and that the test result is clearly positive

c) Confirm that the results listed in the laboratory report match the test worksheets

d) Check whether other positive samples were included in the same test batch.

2. Check sample identification

a) Check the identification of the positive sample, and the corresponding animal identification on the specimen submission documents

b) Check the animal identification on the original sample tube against the information included on specimen submission documents

c) In the case of sentinel animals, confirm that the positive animal has been tested previously with negative results.

[11] The dimensions of a local area will vary with the typical size of properties and stocking rate, but in many parts of Australia could be approximated by a local government area (LGA).

3. Additional testing

a) No additional testing is required for AV or BEFV

b) If a non-NAMP arbovirus is detected, it should be typed using appropriate serological or molecular methods (if these tests are not available at the testing laboratory, the positive sample or isolate should be referred to ACDP for typing)

4. Reporting

a) Confirmed serological results for AV and BEFV should be uploaded to NAMP-Info as soon as possible

b) Any new or emerging arboviruses should be reported to the state or territory CVO, who will decide if further notifications or actions are required

c) Detection of other arboviruses should be reported within the State or Territory Coordinator's report at the annual meeting of the Technical Committee.

8 Responding to vector detections

The approach to be followed when responding to the detection of arbovirus vectors is outlined below.

Detection in BTV transmission zone and buffer area

- Routine detection within known seasonal occurrence:
  1. Verify species identity locally
  2. Confirm species presence at this site previously
- Non-routine detection outside of known seasonal occurrence:
  1. Verify species identity locally
  2. Obtain confirmation of identification through DNA sequencing and/or through Reference Entomologist[12]
  3. Confirm species presence/absence at this site previously
  4. Check sample handling and labelling procedures to ensure the detection was not a contaminant or mislabelled
  5. If the collection was subsampled, check entire collection for further conspecific specimens
  6. Check that the other species in the collection are all known to occur at the site to provide support that the collection was labelled properly
  7. Check the condition of the specimen(s) to confirm they are not more shrivelled than other specimens in the collection which may suggest it is a contaminant
  8. Check nearest known locality of the midge species and any recent arbovirus activity nearby, including Simbu group viruses if possible and review whether the detection is consistent, or not, with activity (i.e. *Culicoides* vectors or arbovirus) at nearby sites
  9. Once confirmed, advise state NAMP coordinator, and NAMP Technical Committee through the Program Manager (AHA)
  10. Upload data to NAMP database

Detection in BTV transmission free zone

- Routine detection within known seasonal occurrence:
  1. Verify species identity locally
  2. Confirm species presence at this site previously
- Non-routine detection outside of known seasonal occurrence:
  1. Verify species identity locally
  2. Obtain confirmation of identification by PCR and/or through Reference Entomologist[2]
  3. Confirm species presence/absence at this site previously
  4. Check sample handling and labelling procedures to ensure the detection was not a contaminant or mislabelled

[12] If the original identification was made by the NAMP Reference Entomologist, then it may be appropriate and useful to confer with a second entomologist from the Technical Committee.

5. If the collection was subsampled, check entire collection for further conspecific specimens
6. Check that the other species in the sample are all known to occur at the site to provide support that the collection was labelled properly
7. Check the condition of the specimen(s) to confirm they are not more shrivelled than other specimens in the collection which may suggest it is a contaminant
8. Check nearest known locality of the midge species and any recent arbovirus activity nearby, including Simbu group viruses if possible
9. Once confirmed, advise state NAMP coordinator, and NAMP Technical Committee through the Program Manager (AHA)
10. Upload data to NAMP database
11. The outcome of this process may lead to additional regional surveillance

9 Altering BTV zones

9.1 General rules for BTV zone changes

A conservative approach will be taken by the Technical Committee to any alterations to the BTV zones in order to minimise the risk of sourcing arbovirus-infected animals for export. This applies equally to expansions and contractions of the BTV Transmission Zone.

Over-and-above this, the following general rules should be followed:

- The border between the BTV Transmission Zone and the Buffer Area must be at least 50 km from the closest evidence of viral transmission in cattle in the previous 2 years. An exception to this may granted by the Technical Committee on the grounds of robust science-based argument. This may include consideration of geographical and climatic factors, as well as the distribution and density of vectors and serological evidence for the distribution of BTV. If an exception is granted, then the rationale for this should be documented by the relevant State or Territory Coordinator(s).
- The Buffer Area must be at least 50 km in width.
- The BTV Transmission-Free Zone must be at least 100 km from the nearest evidence of viral transmission in cattle in the previous 2 years. An exception to this may granted by the Technical Committee on the grounds of robust science-based argument. This may include consideration of geographical and climatic factors, as well as the distribution and density of vectors and serological evidence for the distribution of BTV. If an exception is granted, then the rationale for this should be documented by the relevant State or Territory Coordinator(s).
- The boundary between the Buffer Area and the BTV Transmission-Free Zone must be identifiable and able to be communicated to producers, exporters, trading partners and other stakeholders. The boundary may make use of natural, artificial or administrative boundaries (for example, local government or postal code boundaries, or the administrative boundaries used by state or territory government animal health authorities).
- A property whose boundary lies partly within the Buffer Area or BTV Transmission Zone will be deemed to lie entirely outside of the BTV Transmission-Free Zone (that is, at higher risk). An exception to this may granted by the Technical Committee on the grounds of robust science-based argument. This will typically apply to the scenario of a very large property in northern Australia.

9.2 Proactive zone changes

9.2.1 Introduction

In order to minimise any potential risk to trading partners, to maximise possibilities for trade and to protect the integrity of Australia's surveillance and certification systems, State and Territory Coordinators may at any time recommend changes to the BTV zone map in their respective jurisdictions.

The recommendation, together with supporting information and details of proposed changes to the BTV zone map, will be provided to the Program Manager for consideration by the Technical Committee.

Proactive changes may:

- Expand the BTV Transmission-Free Zone where evidence demonstrates freedom from BTV transmission for at least the previous 24 months; or
- Contract the BTV Transmission-Free Zone where recent surveillance, seasonal weather conditions and/or other information suggest that wider BTV virus transmission may occur.

9.2.2 Information required for a proactive zone change

The recommendation of a State or Territory Coordinator should be based on scientifically defensible data which explain the epidemiology of BTV in the region concerned at an acceptable level of confidence, and in accordance (as far as is practicable under Australian conditions) with the WOAH Terrestrial Animal Health Code (Article 8.3.16: *Surveillance strategies*).

The submission should aim to integrate the following information (to the extent that it is available):

- The sampling regime that defined the existing BTV Transmission Zone in the area of interest – this should include the location and frequency of sampling, including
  - A map of the location of the sentinel and serosurveillance herds in the region of interest for each year over the past 3 years
  - A table of the dates and results of sampling of sentinel and serosurveillance herds in the region of interest for each year over the past 3 years
  - The date and location of the last confirmed positive result
  - Population density of cattle and other susceptible species in the area of interest, with a comparison of the last 2 years and the preceding decade
  - Sample size (based on knowledge of population size)
- The outcomes of vector monitoring within the area of interest
- Historical data showing the start and end dates of the BTV transmission season within the area of interest
- A climate-based forecast of likely arbovirus risk for the ensuing BTV transmission season within the area of interest, and comparing this with the climate conditions during the previous two BTV transmission seasons and the distribution of BTV during the preceding 10 years
- Any other information that may be relevant to the submission, including any climate, vector or virus modelling studies, relevant geographical information or relevant information about the livestock industries within the area of interest.

9.2.3 Timing of submissions for proactive zone changes

In order to enable sufficient consideration and consultation, proactive zone change proposals can only be made at annual meeting of the Technical Committee.

Submissions for proactive zone changes should be submitted on a meeting paper template to the Program Manager **at least 3 weeks prior** to the annual meeting of the Technical Committee. State and Territory Coordinators should ensure that all data for the previous year has been uploaded to NAMP-Info, including

any test results requiring confirmation. The proposal must include an indicative map showing the relevant monitoring sites, property boundaries and proposed zone boundary change.

Animal Health Australia will distribute the proactive zone change papers to the committee with the meeting papers.

9.3 Reactive zone changes

9.3.1 Introduction

Reactive zone changes are those enacted in response to a **confirmed** routine or non-routine BTV detection within the BTV Transmission-Free Zone or the Buffer Area (Sections 7.1 and7.2, respectively).

9.3.2 Procedural steps for reactive zone changes

The sequence of steps outlined below should be followed to enable a reactive zone change:

1. State or Territory Coordinator should provide a completed proposal (using the Zone Change Template at Appendix III) to the Technical Committee by way of the Program Manager. The proposal must include an indicative map showing the relevant monitoring sites, property boundaries and proposed zone boundary change. Significant towns should be shown on the map.
2. Technical Committee reviews the proposal. If further information is required, a request should be issued by the Program Manager within 72 hours. A teleconference may be convened if required.
3. Technical Committee provides its response to the proposal using the NAMP zone change proposal template. This should be submitted within a further 3 days, or no more than 5 days from the original proposal if further information was not required.
4. Program Manager may return to the Technical Committee for further clarification but will otherwise finalise the zone change and request that the Application Support Contractor makes the required changes to the online map.

An automatic email will then be distributed to NAMP subscribers.

The time from submission of the proposal to issuance of the zone change email should not exceed 14 working days.

State and Territory Coordinators should contact their CVO, and the officers responsible for export certification, to ensure that the zone change has been received.

The Australian Government Department of Agriculture, Fisheries and Forestry representative on the Technical Committee should also ensure that relevant parts of the Department are made aware of the zone change. If required, the status of current export certificates should be reviewed, and advice issued to trading partners.

9.3.3 Resolution of disagreements about reactive zone changes

A zone change will only be actioned under the sequence of steps outlined in Section 9.3.2 above if consensus has been reached within the Technical Committee.

If consensus is not reached, then the Australian Chief Veterinary Officer (ACVO, or their delegate) will chair a meeting of the Technical Committee to address the matter. If disagreement remains, then the matter will be referred to the Steering Committee and the ACVO will chair a meeting to address the matter. Resolution of disagreement will only be recognised by consensus. If consensus is not reached, the zone change proposal will not be implemented and additional monitoring may be required. An alternative or compromise course of action may also be taken if agreed by consensus of the Steering Committee.

Appendices

I. Protocol: investigating BTV detections outside NAMP surveillance activities

Where a positive BTV test result has been obtained from an animal that is believed to reside within a herd located in the BTV Transmission-Free Zone, and has not resided within, or travelled through, the BTV Transmission Zone or Buffer Area, then the CVO may choose to submit to the Technical Committee (through their State or Territory Coordinator) a proposal to enhance or alter NAMP surveillance activities within the local area.[13] This proposal may include a request for the establishment of a new sentinel herd(s) or serosurveillance herd(s), and/or the establishment of new vector monitoring sites.

The resolution of the unexpected result, detected outside of NAMP surveillance activities, is the responsibility of the jurisdiction.

Determination of local transmission

Before submitting this proposal to the Technical Committee to enhance or alter NAMP surveillance activities within the local area, or to follow up the detection with additional testing by the jurisdiction, state or territory animal health staff are encouraged to consider the protocol provided below. This protocol provides guidance to help clarify the status of both individual animals and the herd and, if likely to be a true positive, to determine whether local transmission is occurring at that site. This protocol also includes recommendations about investigating the epidemiology of the incident.

In this context, the demonstration of the local transmission of BTV should include laboratory evidence and/or epidemiological argument in support of the temporal progression of exposure, infection and subsequent transmission of the virus within the herd and/or between herds within a local area. It is recommended that a vector be identified, and the activity of this vector within the local area should coincide with the putative exposure of test-positive animals. The dimensions of a local area will vary with the typical size of properties and stocking rate, but in many parts of Australia could be approximated by a local government area (LGA).

Preliminary investigations

1. Check test results

To the extent that it is possible with the information to hand, the following steps should be taken to check the test results:

a) Check the quality control parameters for the test for which the positive result has been obtained

b) Ensure the sample replicates exhibit acceptable reproducibility, and that the test result is clearly positive

c) Confirm that the results listed in the laboratory report match the test worksheets

[13] The dimensions of a local area will vary with the typical size of properties and stocking rate, but in many parts of Australia could be approximated by a local government area (LGA).

d) Check whether other positive samples were included in the same test batch.

2. Check sample identification

To the extent that it is possible with the information to hand, the following steps should be taken to verify sample identification:

a) Check the identification of the positive sample, and the corresponding animal identification on the specimen submission documents

b) Check the animal identification on the original sample tube against the information included on specimen submission documents

3. Check the animal identification and movement history

This step will be critical to confirming that the detection warrants the cost and other resources associated with the comprehensive follow-up of BTV detections (below).

The identification of the animal(s) that has returned a positive result, and its herd mates, should be confirmed through a farm visit. This should include scanning NLIS tags and verifying that there is no evidence to suggest that any of the tags have been replaced or otherwise tampered with.

The movement history of the animal(s) that has returned a positive result, and its herd mates, should be obtained from NLIS. A record should also be obtained of all animals that have been brought onto and moved off the property within the previous 2 years, and their source and destination. These records should be cross-checked with herd management records from the affected property.

Additional clarificatory testing

Having verified the test result and animal identification, additional testing can be used to clarify and confirm the status of the herd from which the positive result(s) was obtained. The protocol followed will vary to an extent with the location of the herd and its history. The following should be used as a guide:

Additional testing for the clarification of BTV results:

d) Retesting: retest the positive sample and either all or a sample of the negative samples from the herd

e) Clarify serogroup: retest the positive sample(s) other serogroup-specific tests for BTV – that is, other BTV ELISA, BTV AGID

f) Clarify serotype: BTV VNT or other appropriate serological or molecular methods should be used to identify the serotypes that have been detected in Australia.

Sufficient whole blood from the positive animal(s) should be stored appropriately for possible later pathogenicity testing (virus transmission studies) or other purposes.

Unexpected non-routine positive BTV results should also be evaluated using a pan-reactive PCR.

Where the original result was supported by additional serology (above), but was not supported by pan-reactive PCR, and where competent *Culicoides* vectors have not previously been detected in the area, a

selection of tests for other arboviruses (for example, EHD AGID/ELISA, Simbu group ELISA, assays specific for individual Simbu viruses) should be used to investigate *Culicoides* activity.[14]

A guide for the interpretation of clarificatory testing is given in Figure 2.

Figure 2 Clarification of detections of BTV from outside NAMP surveillance

[14] Note that the Simbu group ELISA is more appropriate than testing for AV antibodies in the first instance, as AV may not be the predominant Simbu group virus being transmitted in any given season.

Herd status and follow-up

Having clarified the status of individual animals, the status of the herd can be guided by the following rules:

- If all the tested animals are conclusively negative, then the herd will be considered negative, and no further action will be required.
- If at least one tested animal is positive or uncertain, then the herd will be considered provisionally positive and will be evaluated further.

Unexpected provisionally positive herds (above) should be evaluated carefully to establish possible pathways for the movement of the virus to that area. The evaluations will be undertaken by the State or Territory Coordinator(s), under the jurisdiction of the relevant CVO(s). Guidance should be sought from the Technical Committee.

If the investigation supports the local transmission of BTV, then consideration should be given for a proposal to the Technical Committee to establish or augment surveillance for BTV within the local area. At the discretion of the Technical Committee, this may include the establishment of a sentinel or serosurveillance herd(s) and/or new vector monitoring sites.

II. Instructions for light trap co-operators

Introductory letter for co-operators

The text below should be provided to light trap co-operators in the form of an introductory letter.

Dear NAMP Co-operator

Thank you for helping us to monitor and study the distribution of biting midges through a network of light traps established throughout Australia. These midges can spread virus diseases to livestock and wildlife.

Monitoring is carried out to:

- Identify and understand those midges which act as vectors of viruses (bluetongue, Akabane and bovine ephemeral fever) affecting livestock production and exports
- Predict vector movements and disease outbreaks
- Define vector (and therefore virus) free zones to facilitate the export of livestock
- Detect introductions of exotic vector species
- Record native species of midges and consider their potential as vectors of viruses affecting livestock and the native fauna

Midges will be monitored (monthly) as part of the National Arbovirus Monitoring Program (NAMP).

A summary of the previous season's results and the procedures for locating and operating your light trap plus troubleshooting hints are provided for your information.

Result Summary (Example text only)

Forty-seven light trap sites were established in 2007-2008.

These included seven sites in Vic (3), SA (3) and Tasmania (1). No samples were taken at one western site because of the drought. No samples were returned from Taree, Mudgee and Richmond due to Departmental Officers assisting in the Equine Influenza campaign. Fluctuating drought conditions were experienced throughout most of NSW. Those sites where *Culicoides brevitarsis* was present (+) and the month that it first appeared are marked on the table on the next page. Movement and numbers of *C. brevitarsis* were generally later with previous years in terms of presence and predictability. Berry recorded low numbers of *C. brevitarsis* in March and was the southern extent of its distribution. Camden recorded *C. brevitarsis* in April. Movement up the Hunter Valley was limited, and was consistent but slower than the predicted distributions. *C. brevitarsis* was recorded at Denman and Singleton in March and April. None were recorded in Scone. *Culicoides wadai* was recorded in NSW at Lismore in May 2008.

We can predict the expected time of arrival of *C. brevitarsis* in most areas of NSW. Combined with predictions of last occurrence and the probability of survival during winter at these sites we can clearly define areas that are seasonally free of vectors. Possible movements of *C. brevitarsis* into northern and western NSW from Queensland were only recorded at Tenterfield. Studies made in 2002-2004 have shown that greater trapping efficiency can be achieved in marginal areas using traps with green LEDs instead of incandescent globes.

Viruses

Activity of the bluetongue, Akabane and Bovine Ephemeral Fever viruses in the years 2004-2007 are given in the attached 2006- 2007 Australian Animal Health Council Report. In 2007-2008, Akabane activity was recorded down the coastal plain as far south to Camden, up onto the Tablelands at Yarrowitch and up into the Hunter Valley as far as Singleton. Extensive ephemeral fever transmissions have been recorded in NSW this year. In late February cases were recorded west of the Great Dividing Range from the Queensland border to Finley near the Victorian border. This virus is most likely spread by a mosquito, *Culex annulirostris*. Bluetongue seroconversions were recorded in NSW from Casino and Coffs Harbour sentinel herds in April 2008.

Southern States

No vectors or viruses were recorded in Victoria, South Australia or Tasmania.

Applications from project

The project continues to support trade agreements for the export of livestock from Australia. Agreements have now been reached with a number of countries that are sensitive to the presence of viruses in livestock. Negotiations are current to allow the export of stud dairy cattle from NSW to China. Our experiments are designed to demonstrate seasonal freedom from vectors and virus and to devise methods of protecting livestock during their transport to ports. Your cooperation in this project therefore continues to aid a multi-million-dollar export industry.

Planning

The following instruction should be provided to light trap co-operators:

- Keep your calendar handy as a reminder of future trapping dates
- Set the light-trap in the field for two nights (only) at any time during each of the periods highlighted in yellow on the calendar provided
- Do not set the trap in the week of the full moon (dates circled red on calendar) and avoid nights with strong winds and storms
- Set the light-trap before dusk.

Pre-placement checks

The following instruction should be provided to light trap co-operators:

- Ensure light trap is fully operational before setting in the field
- Use new batteries in the trap on each trapping event
- Replace lid of battery box and test trap by placing a cloth or handkerchief over the light sensor. Green light and fan must be operational
- Make sure that the inner seal, if present, of the sample bottle is removed before attaching to the trap
- Check the bottle contains approximately 125-150mls of ethanol
- Fit by-catch exclusion net if provided.

Troubleshooting hints

The following instruction should be provided to light trap co-operators:

- When testing the trap covering the light sensor with fingers or hand may allow sufficient light through to sensor to prevent operation
- If light and fan do not work – check polarity of batteries
- If fan works but light does not – pinch lamp holder gently to improve contact
- If trap runs continually during daylight hours, check light sensor tube for insect nest or dirt.
- Trap working and no insects caught – too cold; too windy; check trap as spiders sometimes make webs inside the trap. Also check to make sure that the inner seal of the bottle (depending on bottle type in use) had been removed before the bottle was attached
- Alcohol low in collection bottle – this can be caused by wind and heat. Use ethanol from the extra bottle supplied to top-up the level.
- Water in trap after rain – allow insects to settle, then pour off as much water as possible. Top-up with extra ethanol.
- No extra ethanol left – ask for more. Methylated spirits can be used in an emergency.

Setting the trap

The following instruction should be provided to light trap co-operators:

- Hang the trap from a tree branch, about 2 m from the ground (that is, out of reach of livestock) and with a 360-degree field of view
- Locate the trap where cattle are constantly present or nearby
- If located near a dairy or other building, place where there is no competition from other lights.

Recovering the trap

The following instruction should be provided to light trap co-operators:

- Collect the bottle after two (2) nights
- Bring the trap in to preserve its condition
- Label the bottle with sticky labels provided (your name, location and date)
- Bottles will either be collected, or you may forward them to your local state or territory department or to the Local Land Services (NSW)
- Please return samples in a sturdy box, double plastic bagged with absorbent material in the outer bag
- Please forward the collected samples as soon as possible after the collection event to avoid the deterioration of specimens.

Supplies for light trap co-operators

State and Territory Coordinators should provide the following additional items to co-operators ahead of each 6-month season:

- 12 or more yellow top specimen containers (70 mL)
- 18 or more snap lock biological hazard specimen bags or equivalent (at least 18x17 cm)
- Six or more large snap lock bags (at least 26x38 cm)
- Six or more shipping boxes
- Six or more contents slips.

III. Zone Change Template

NAMP TECHNICAL COMMITTEE **FOR DECISION**

Date:

BTV ZONE MAP CHANGE PROPOSAL

Purpose

1. To **NOTIFY** the NAMP Technical Committee that bluetongue virus transmission is confirmed in an unexpected location.
2. To seek **ENDORSEMENT** from the NAMP Committee for a proposed change to the bluetongue virus zone map.
3. To seek **ENDORSEMENT** from the NAMP Technical Committee for the proposed text to be used in the email alert notification.

- To seek ENDORSEMENT for EXPANSION/CONTRACTION of […] and corresponding text for the email alert notification (see below).

Description (to be accompanied by the proposed amended zone map(s) as Attachment(s)

-

Testing Results (consideration should be given to serology results in the nearby area and vector populations)

-

Protocols (as per the Operational Plan)

Please check the box that applies and provide an explanation below for incomplete protocol steps.

Sample	**Yes**	**No**
Test results confirmed	☐	☐
Sample identification confirmed	☐	☐
Additional livestock testing	☐	☐
Animal status confirmed	☐	☐

Notification	**Email**	**Phone**	**No**
State/Territory CVO	☐	☐	☐
Australia Government	☐	☐	☐
Livestock Exporters Association	☐	☐	☐
AHA NAMP Manager	☐	☐	☐

Details

-

Issues for Discussion (if applicable)

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Email alert notification - Proposed text

Dear NAMP Bluetongue Zoning Map user,

This is an automated message to notify you that the Australian bluetongue zoning map has been updated.

Please go to http://namp.animalhealthaustralia.com.au/public.php?page=namp_public&program=2 to view or download the current version of the map.

[**To be modified or equivalent text provided by State Coordinator:**
During routine monitoring, evidence of bluetongue virus infection has been detected in [e.g. sentinel herds] in the [Location]. These detections have resulted in an expansion of the zone of possible transmission in these regions of [State/Territory]. There is no evidence of clinical disease associated with these infections.

Or

Following the absence of transmission of bluetongue virus in areas [Location] in the [State/Territory] for the past two years, there has been an increase in the number of properties included in the bluetongue-free zone.]

Although bluetongue viruses are present in northern and eastern Australia, clinical disease is an uncommon occurrence in Australian sheep and has never been reported in any other susceptible animal species in Australia. Bluetongue surveillance and zoning is conducted under the National Arbovirus Monitoring Program (NAMP), managed by Animal Health Australia. Further information about NAMP and bluetongue virus zoning in Australia can be found at: http://namp.animalhealthaustralia.com.au.

Recommendations (responses to be made on out-of-session paper provided)

That the NAMP Technical Committee:

1. **ENDORSES** the proposed change to the bluetongue virus zone map as shown in Attachment […] and available on NAMP*Info*.
2. **ENDORSES** the proposed text to be used in the email alert notification.

Author

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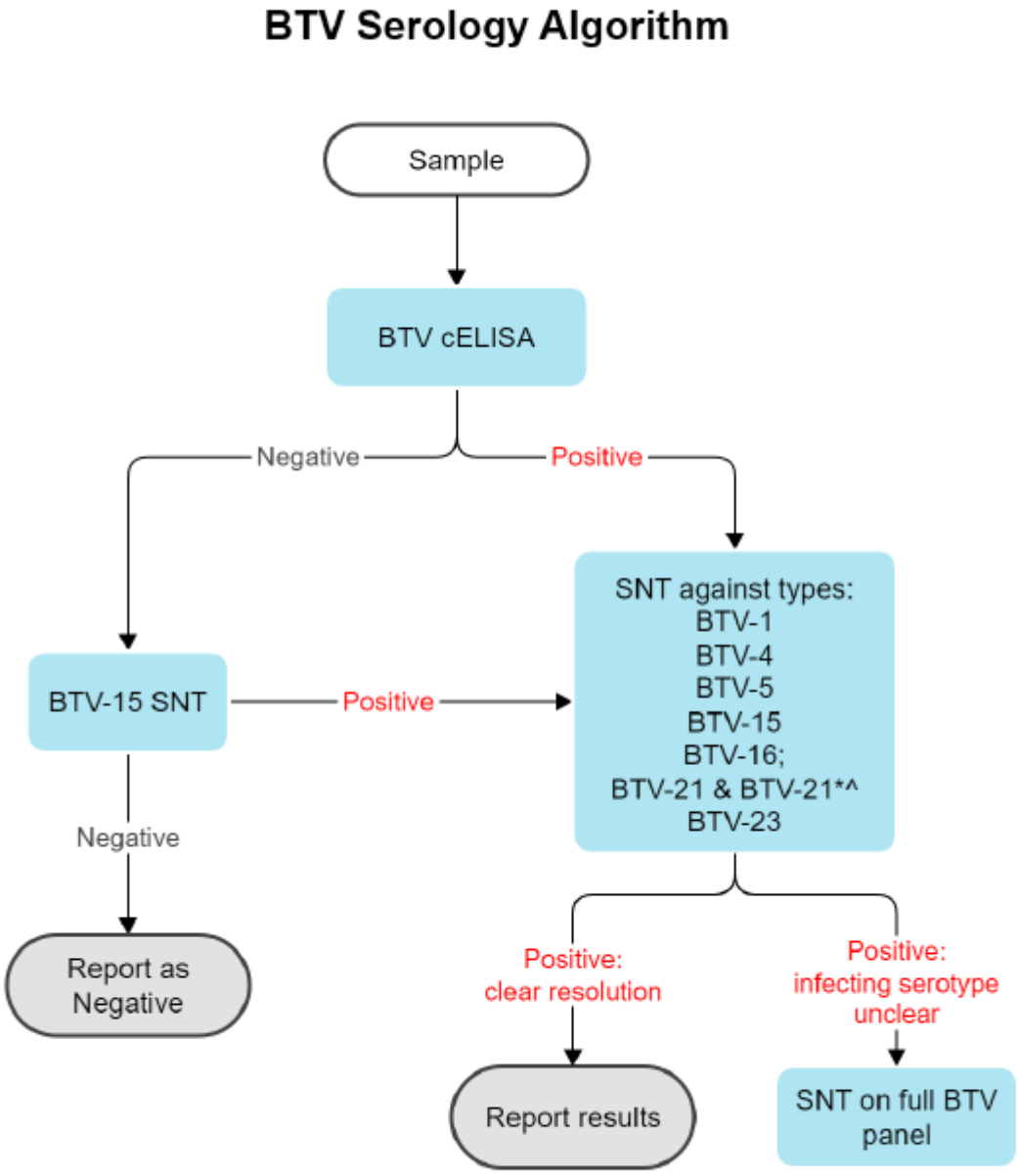
IV. ACDP BTV serology testing algorithm

A schematic diagram of the new serology algorithm is shown below:



^BTV-21* is a 2017 isolate of BTV-21 from the Northern Territory. This virus is included in the panel to detect circulation of BTV-21 viruses that are antigenically divergent from the prototype virus.

V. Virology testing protocols by jurisdiction

	ACDP	NSW	NT	Qld	SA	Tas	Vic	WA
Bluetongue (BTV)	Serology: Repeat cELISA, followed by an initial reduced SNT panel for determination of serotype. If serotype unresolved, proceed to extended serotype panel. Molecular: Repeat PanPCR, followed by VP2 and VP3 sequencing for determination of serotype and genotype. Characterisation capability is currently for low Ct samples (e.g Ct <32 on PanPCR). Virology: BTV isolation attempted on select samples. VNT typing assays conducted on isolates for confirmation of serotype.	Primary: ELISA Subsequent: PanPCR on sample collected at time of seroconversion and previous collection. Selected serotype specific PCRs on Pan PCR positive samples (1,2, 16, 21 (multiplex PCR)) Pan PCR and selected serotype testing for seroconverted animals during rest season. Run full PCR panel (13-serotypes; 3xmultiplex and 1 singleplex PCRs) on PCR positive animals at end season (June/July). VI on first detection of each serotype in an animal based on PCR results.	Primary: cELISA. Subsequent: PanPCR on sample collected at time of seroconversion and previous collection. Serotype specific PCRs on Pan PCR positive samples (multiplex PCRs-1,2,16,21 + 3,5,7,9 + 12,15,20,23 run sequentially until a positive is obtained). VI performed on all Pan PCR samples with a Ct < 30. All animals that test ELISA positive at the last bleed to have VNTs – use serotypes that have been circulating this season and the last 2 seasons.	Primary: cELISA Supplementary: If sample represents seroconversion, PanPCR. Referral: If positive to PanPCR and Ct value is less than 30, especially from NQ sites due to risk of incursion, refer to ACDP (VNT and serotype and genotype PCR). If there are many positive PCR results, only a sample of the strongest reactors are referred.	Primary: cELISA. Send all testing to NSW.	ELISA (conducted by NSW)	Primary: cELISA. Supplementary: cELISA (also sent to ACDP)	Primary: cELISA. Supplementary: positive refer to ACDP (VNT)

	ACDP	NSW	NT	Qld	SA	Tas	Vic	WA
Akabane (AKA)	-	Akabane ELISA supplementary to Simbu group seroconversion (ELISA) and at end of season for Simbu group seropositive animals.	Akabane VNT performed only in Alice Springs and any serosurvey herds. Positive samples undergo VNTs with Douglas and Aino viruses. Occasionally, positive samples are sent to EMAI for confirmatory testing.	VNT every bleed	Akabane only follow up after Simbu-ELISA or VNT.	Akabane ELISA supplementary to Simbu group seroconversion (ELISA) and at end of season for Simbu group seropositive animals (conducted by NSW)	Not testing.	cELISA
Bovine ephemeral fever (BEF)	-	ELISA (non-endemic strategic)	VNT every bleed	VNT every bleed.	ELISA (NSW performs)	ELISA (conducted by NSW)	VNT	VNT sentinel herds only.
Epizootic hemorrhagic disease (EHD)	-	Not currently testing. ELISA capability.	ELISA- Beatrice Hill monthly	Not currently testing but have capability to perform AGID.	Not testing.	Not testing.	Not testing.	Not testing.
Simbu*	Receive ELISA reactors – performed PRNT panel (Schmallenberg, Akabane, Douglas, Peaton, Aino)	ELISA	No longer perform.	No Simbu (apart from AKA).	ELISA (conducted by NSW).	ELISA (conducted by NSW).	ELISA	ELISA 50% sentinel herd.

* Not tested for in Northern Australia as not needed to support trade.