WEE COMPLEX: (base pairings indicated by '<>'s were shown not to be important for frameshifting in SINV; mutation experiments in SINV support the functional importance for frameshifting of the stem indicated by '()'s)

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                                <<<<<<<<<<((((((((((((   ))))))))))))        >>>>>>>>>>>
     1 AF339479 WHAV  UUUUUUAUUGGUUGCUGGCGUCUACCUCUCGAAGGCAGACGCCUACGAACAUGCGACCACUGUUCCCAACGUGCCUCAAAUACCGUAUAAGGCCCUCGUA
     1 U90536   SINV  UUUUUUAGUAGUUGCAGGCGCCUACCUUGCGAAGGUAGACGCCUUCGAACAUGCGACCACUGUCCCAAAUGUGCCGAGGAUUCCGUAUAAGGCUCUGGUC
     1 AF429428 SINV  UUUUUUAGUGGUUGCAGGCGCCUACCUGGCGAAGGUAGACGCCUUCGAACAUGCGACCACUGUCCCAAAUGUGCCGAAGAUUCCGUAUAAAGCUUUGGUC
     1 AF103734 SINV  UUUUUUAGUGGUUGCCGGCGCCUACCUGGCGAAGGUAGACGCCUACGAACAUGCGACCACUGUUCCAAAUGUGCCACAGAUACCGUAUAAGGCACUUGUU
     7 BD269910 SINV  UUUUUUAGUGGUUGCCGGCGCCUACCUGGCGAAGGUAGACGCCUACGAACAUGCGACCACUGUUCCAAAUGUGCCACAGAUACCGUAUAAGGCACUUGUU
     1 M24200   SINV  UUUUUUAGUGGUUGCCGGCGCCUACCUGGCGAAGGUNGACGCCUACGAACAUGCGACCACUGUUCCAAAUGUGCCACAGAUACCGUAUAAGGCACUUGUU
     2 U38304   SINV  UUUUUUAGUGGUUGCCGGCGCCUACCUGGCGAAGGUAGACGCCUACGAACAUGCGACCACUGUUCCAAAUGUGCCACAGAUACCGUAUAAGGCACUUGUU Sindbis-like
     1 M69205   SINV  UUUUUUAGUGGUUGCCGGCGCCUACCUGGCGAAGGUAGACGCCUACGAACAUGCGACCACUGUUCCAAAUGUGCCACAGAUACCGUAUAAGGCACUUGUU Ockelbo
     1 AF339477 SINV  UUUUUUAGUGGUUGCCGGCGCCUACCUGGCGAAGGUAGACGCCUACGAACAUGCGACCACUGUUCCAAAUGUGCCACAGAUACCGUAUAAGGCACUUGUU Babanki
     2 AF103728 SINV  UUUUUUAGUGGUUGCCGGCGUCUACCUGGGGAAGGUAGACGCCUACGAACAUGCGACCACCAUUCCAAAUGUGCCGAAGAUUCCGUAUAAAGCACUUGUA
     1 AF339478 SINV  UUUUUUAGUGGUUGCCGGCGUCUACCUGGGGAAGGUAGACGCCUACGAACAUGCGACCACCAUUCCAAAUGUGCCGAAGAUUCCGUAUAAAGCACUUGUA Kyzylagach
     1 DQ451588 FMV   UUUUUUAUUGGUUGCCGGCGUCUGCCUGGGGAAGGCAGACGCCUACGAACAUGCGACCACUGCGCCAAAUGUACCGGGAGUGCCGUAUAAGGCACUGGUA Buggy Creek
     7 DQ451577 FMV   UUUUUUAUUGGUUGCCGGCGUCUGCCUGGGGAAGGCAGACGCCUACGAACAUGCGACCACUGUGCCAAAUGUACCGGGAGUGCCGUAUAAGGCACUGGUA Buggy Creek
     4 DQ451579 FMV   UUUUUUAUUGGUUGCCGGCGUCUGCCUGGGGAAGGUAGACGCCUACGAACAUGCGACCACUGUGCCAAACGUACCGGGAGUGCCGUAUAAGGCACUGGUA Buggy Creek
    26 AF339474 FMV   UUUUUUAUUGGUUGCCGGCGUCUGCCUGGGGAAGGUAGACGCCUACGAACAUGCGACCACUGUGCCAAAUGUACCGGGAGUGCCGUAUAAGGCCCUGGUG Buggy Creek
     1 DQ451578 FMV   UUUUUUAUUGGUUGCCGGCGUCUGCCUGGGGAAGGUAGACGCCUACGAACAUGCGACCACUGUGCCGAACGUACCGGGAGUGCCGUAUAAGGCACUGGUA Buggy Creek
     3 DQ451557 FMV   UUUUUUACUGGUUGCCGGCGUCUGCCUGGGGAAGGUAGACGCCUACGAACAUGCGACCACUGUGCCAAAUGUACCGGGAGUGCCGUAUAAGGCCCUGGUG
     3 AF339475 FMV   UUUUUUAUUGGUUGCCGGCGUCUGCCUGGGGAAGGUAGACGCCUACGAACAUGCGACCACUGUGCCAAAUGUACCGGGAGUGCCGUAUAAGGCCCUGGUG
     1 DQ393790 WEEV  UUUUUUAUUGGUUGCAGGCGUCUGCCUGGGGAAGGUAGACGCCUUCGAACAUGCGACCACUGUGCCAAAUGUUCCAGGGAUCCCGUAUAAGGCGUUGGUC
     1 DQ393793 WEEV  UUUUUUAUUGGUUGCAGGCGUCUGCCUGGGGAAGGUAGACGCCUUCGAACAUGCGACCACUGUGCCAAAUGUUCCGGGGAUCCCGUAUAAGGCGUUGGCC
     8 AF214040 WEEV  UUUUUUAUUGGUUGCAGGCGUCUGCCUGGGGAAGGUAGACGCCUUCGAACAUGCGACCACUGUGCCAAAUGUUCCGGGGAUCCCGUAUAAGGCGUUGGUC
     1 DQ393792 WEEV  UUUUUUAUUGGUUGCAGGCGUCUGCCUGGGGAAGGUGGACGCCUUCGAACAUGCGACCACUGUGCCAAAUGUUCCGGGGAUCCCGUAUAAGGCGUUGGUC
     1 AF339476 HJV   UUUUUUAUUGGUUGCAGGCGUCUGCCUGGGAAAGGCAGACGCCUACGAACAUGCGACCACUGUGCCAAAUGUUCCGGGAGUCCCGUAUAAAGCGCUAGUG
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AURA VIRUS:

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                                << <<<<<<   <<<<  <<     >> >>>>             >>>>>> >>
     2 AF126284 AURAV UUUUUUAUUGGUUGCCAGUCCUCCUAACAAAGCGGACGCCUACGAACAUACGAUCACUGUCCCAAAUGCGCCGUUGAACUCGUAUAAAGCACUAGUGGAA
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EEE COMPLEX: (base pairings indicated by '<>'s were shown not to be important for frameshifting in EEEV)

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                                <<<<<((((((((((   ))))))))))                                >>>>>>>
     1 AF159550 EEEV  UUUUUUACUUGUCUGCGGCGCCUUGGGCGCCGCAACGUACAAACACACAGCAGUGAUGCCGAACAAGGUGGGGAUCCCGUAUAAAGCUUUAGUCGAACGC
     1 AF159553 EEEV  UUUUUUACUUGUCUGCGGCGCCUUGGGCGCCGCAACGUACGAACACACAGCAGUGAUGCCGAACAAGGUGGGGAUCCCGUAUAAAGCUUUAGUCAAACGC
     1 AF159556 EEEV  UUUUUUACUUGUCUGCGGCGCCUUGGGCGCCGCAACGUACGAACACACAGCAGUGAUGCCGAACAAGGUGGGGAUCCCGUAUAAAGCUUUAGUCGAACGC
     1 AF159555 EEEV  UUUUUUACUUGUCUGCGGCGCCUUGGGCGCCGCACCGUACAAACACACAGCAUUGAUGCGAAACAAGGUGGGGAUCCCGUAUAAAGCUUUAUUUGAACGC
     1 AF159559 EEEV  UUUUUUACUUGUCUGCGGCGCCUUGGGCGCCGCAGCAUACGAACACACAGCAGUGAUGCCGAACAAGGUGGGGAUCCCCUACAAAGCGCUGGUUGAACGC
     1 DQ241303 EEEV  UUUUUUACUUGUCUGCGGCGCCUUGGGCGCCGCAGCAUACGAACACGCAGCAGUGAUGCCGAACAAGGUGGGGAUCCCCUACAAAGCGCUGGUUGAACGC
     2 AF159561 EEEV  UUUUUUACUUGUCUGCGGCGCCUUGGGCGCCGCAGCAUACGAGCACACGGCUGUGAUGUCGAACAAGGUGGGGAUCCCUUACAAAGCCCUAGUUGAAAGG
     3 X63135   EEEV  UUUUUUACUUGUCUGCGGCGCCUUGGGCGCCGCAGCGUACGAACACACACAGCAGUGAUGCCGAACAAGGUGGGGAUCCCGUACAAAGCUUUAGUCGAACGC
    18 AF159551 EEEV  UUUUUUACUUGUCUGCGGCGCCUUGGGCGCCGCAGCGUACGAACACACAGCAGUGAUGCCGAACAAGGUGGGGAUCCCGUAUAAAGCUUUAGUCGAACGC
     1 U01555   EEEV  UUUUUUACUUGUCUGCGGCGCCUUGGGCGCCGCAGCGUACGAACACACAGCAGUGAUGCCGAACAAGGUGGGGAUCCCGUAUAAAGCUUUAGUCGAGCGC
     2 AF159557 EEEV  UUUUUUACUUGUCUGCGGCGCCUUGGGCGCCGCAGCGUACGAACACACAGCAGUGAUGCCGAACAAGGUGGGGAUCCCGUAUAAAGCUUUAGUUGAACGC
     2 AF159560 EEEV  UUUUUUACUUGUCUGCGGCGCCUUGGGCGCCGCAGCGUACGAACACACAGCCGUGAUGCCGAACAAGGUGGGGAUCCCUUACAAAGCACUGGUUGAACGC
    23 U01616   EEEV  UUUUUUACUU

                                <<<<<(((((((      )))))))                                >>>>>>>
     1 X05816   EEEV  UUUUUUACUUGUCUGCGGCGCUUGGGCCGCAGCGUACGAACACACAGCAGUGAUGCCGAACAAGGUGGGGAUCCCGUACAAAGCUUUAGUCGAACGCCCA
     1 M69094   EEEV  UUUUUUACUUGUCUGCGGCGCUUGGGCGCGGCAGCGUACGAACACACAGCAGUGAUGCCGAACAAGGUGGGGAUCCCGUACAAAGCUUUAGUCGAACGCCCA
     1 U01630   EEEV  UUUUUUGCUUGU
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VEE COMPLEX: (base pairings indicated by '<>'s were shown not to be important for frameshifting in VEEV)

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                                <<<<<<((((((((   )))))))))                  >>>>>>
     3 AF075251 VEEV  UUUUUUAGUCGUGGCCGGCGCCGCAGGCGCCGGCGCAUACGAGCACGCGACCACGAUGCCGAAUCAAGCGGGGAUCUCGUAUAACACCAUAGUCAACAGA Everglades
     2 DQ390224 VEEV  UUUUUUAGUCGUGGCCGGCGCCGCAGGCGCCGGCGCCUACGAGCACGCGACCACGAUGCCGAGCCAAGCGGGAAUCCCGUAUAACACCAUAGUCAACAGA
    22 AF004441 VEEV  UUUUUUAGUCGUGGCCGGCGCCGCAGGCGCCGGCGCCUACGAGCACGCGACCACGAUGCCGAGCCAAGCGGGAAUCUCGUAUAACACCAUAGUCAACAGA
     1 AF093101 VEEV  UUUUUUAGUCGUGGCCGGCGCCGCAGGCGCCGGCGCCUACGAGCACGCGACCACGAUGCCGAGCCAAGCGGGAAUCUCGUAUAACACUAUAGUCAACAGA
     1 AF004852 VEEV  UUUUUUAGUCGUGGCCGGCGCCGCAGGCGCCGGCGCCUACGAGCACGCGACCACGAUGCCGAGCCAAGUGGGAAUCUCGUAUAACACCAUAGUCAACAGA
     2 AF348335 VEEV  UUUUUUAGUCGUGGCCGGCGCCGCAGGCGCCGGCGCCUACGAGCACGCGACCACGAUGCCGAGCCAGGCGGGAAUCUCGUAUAACACCAUAGUUAACAGA
     1 AF093104 VEEV  UUUUUUAGUCGUGGCCGGCGCCGCAGGCGCCGGCGCCUACGAGCACGCGACCACGAUGCCGARCCAAGCGGGAAUCUCGUAUAACACUAUAGUCAACAGA
     1 AF004467 VEEV  UUUUUUAGUCGUGGCCGGCGCCGCCGGCGCCGGCGCCUACGAGCACGCGACCACGAUGCCGAACCAAGUGGGAAUAUCGUAUAAUACCAUAGUCAACAGA
     2 AF075252 VEEV  UUUUUUAGUCGUGGCCGGCGCCGUAGGCGCCGGCGCCUUACGAACACGCGACCACGAUGCCGAACCAAGUGGGGAUCCCGUAUAAUACCAUUGUCAACAGA
     3 AF448537 VEEV  UUUUUUAGUCGUGGCCGGCGCCGUAGGCGCCGGCGCUUACGAGCACGCGACCACGAUGCCGAACCAAGUGGGGAUCCCGUAUAAUACCAUUGUCAACAGA
     4 AF448535 VEEV  UUUUUUAGUCGUGGCCGGCGCCGUAGGCGCCGGCGCUUACGAGCACGCGACCACGAUGCCGAAUCAAGUGGGGAUCCCGUAUAAUACCAUUGUCAACAGA
     1 AF004464 VEEV  UUUUUUAGUCSUGGCCGGCGCCGCAGGCGCCGGCGCCUACGAGCACGCGACCACGAUGCCGAGCCAAGCGGGAAUCCCGUAUAACACCAUAGUCAACAGA
     1 U34999   VEEV  UUUUUUAGUCGUGGCCGGCGCCGUAGGCGCCGGCGCUUACGAGCACGCGACUACGAUGCCGAACCAAGUGGGGAUCCCGUAUAAUACCAUUGUCAACAGA
     1 AF075258 VEEV  UUUUUUAGUGCUAGCCGGCGCCGUAGGCGCCGGCGCAUUCGAGCACGCGACCACGAUGCCGAAUCAGGUGGGGAUGCCGUUUAACACUAUCGUCAAUAGA
     1 AF075257 VEEV  UUUUUUAGUGCUGGCCGGCGCCGCAGGCGCCGGCGCCUUCGAACACGCGACCACGAUGCCGAAUCAGGUGGGAUGCCGUUUAACACUAUAGUGAAUAGA
     1 AF075256 VEEV  UUUUUUAGUGCUGGCCGGCGCCGUAGGCGCCGGCGCAUACGAGCACGCGACUACGAUGCCGAAUCAGGUGGGCAUCCCAUAUAACACCAUAGUGAACAGG
    10 AF004466 VEEV  UUUUUUAGUCAUGGCCGGCGCCGCAGGCGCCGGCGCCUACGAGCACGCGACCACGAUGCCGAGCCAAGCGGGAAUCUCGUAUAACACUAUAGUCAACAGA
     1 AF069903 VEEV  UUUUUUAGUCAUGGCCGGCGCCGUAGGCGCCGGCGCCUACGAGCACGCGACCACGAUGCCGAGCCAAGCGGGAAUCUCGUAUAACACUAUAGUCAACAGA
     1 AF075259 VEEV  UUUUUUAGUCCUAGCCGGCGCCGCCGGCGCCGGCGCUUACGAGCACGCAACAACGAUGCCGAGCCAAGUGGGAAUCCCGUUUAACACCAUCGUGAAUAGG

                                (((((((((    )))))))))
     2 M14937   VEEV  UUUUUUAGUCAUGGCCGGCGCCGCAGCGCCGGCCUACGAGCACGCGACCACGAUGCCGAGCCAAGCGGGAAUCUCGUAUAACACUAUAGUCAACAGAGCA

                                    (((((((    )))))))
     1 J04332   VEEV  UUUUUUAGUCAUGGCCGGGCGCCGCAGCCGGCGCCUACGAGCACGCGACCACGAUGCCGAGCCAAGCGGGAAUCUCGUAUAACACUAUAGUCAACAGAGCA

                                <<<<< <<(((((((((       )))))))))                          >> >>>>>
     2 AF075253 VEEV  UUUUUUAGUCCUAGCAGGCGCCGCAAGCGUCGGCGCCUACGAACACGCAACCACGAUGCCGAAUCAGGUGGGGAUCCCGUAUAAUACAGUAGUCAACCGC
     1 AF075254 VEEV  UUUUUUAGUCCUAGCAGGCGCCGCAAGCGUCGGCGCCUACGAGCACGCAACCACGAUGCCGAAUCAGGCGGGGAUGCCAUUUAACACAGUAGUUAAUCGC
     1 AF075255 VEEV  UUUUUUAGUGCUAGCAGGCGCCGCAAGCGUCGGCGCCUACGAACACGCGACCACGAUGCCGAAUCAGGCAGGCAUCCCGUAUAACACCGUGGUCAACAGA
     1 AY966913 VEEV  UUUUUUAGUGYUAGCAGGCGCCGCAAACGUCGGCGCCUACGAACACGCAACUACAAUGCCGAAUCAAGUGGGGAUCCCGUAUAACACAGUAGUUAACCGA
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