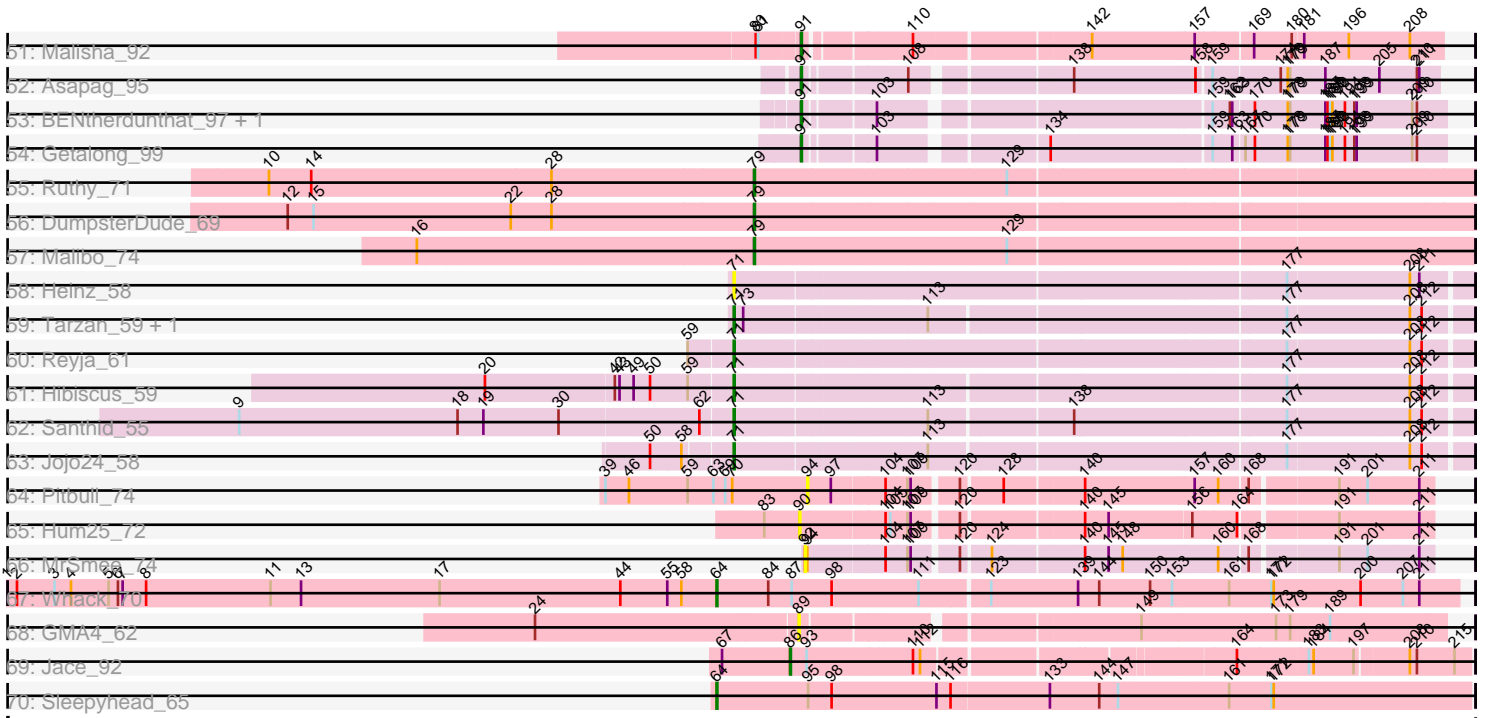




Pham 157751



Note: Tracks are now grouped by subcluster and scaled. Switching in subcluster is indicated by changes in track color. Track scale is now set by default to display the region 30 bp upstream of start 1 to 30 bp downstream of the last possible start. If this default region is judged to be packed too tightly with annotated starts, the track will be further scaled to only show that region of the ORF with annotated starts. This action will be indicated by adding "Zoomed" to the title. For starts, yellow indicates the location of called starts comprised solely of Glimmer/GeneMark auto-annotations, green indicates the location of called starts with at least 1 manual gene annotation.

## Pham 157751 Report

This analysis was run 04/13/24 on database version 558.

Pham number 157751 has 102 members, 12 are drafts.

Phages represented in each track:

- Track 1 : Madraxi\_102
- Track 2 : Jflix2\_100
- Track 3 : Shagrat\_105
- Track 4 : Petra\_84
- Track 5 : Toast\_77, PrincePatrick\_79, Fairfaxidum\_80, PCoral7\_76
- Track 6 : Begonia\_75, Malachai\_75
- Track 7 : Zarbodnamra\_81
- Track 8 : Lysidious\_79
- Track 9 : Melba\_77
- Track 10 : Pipp\_82
- Track 11 : Utz\_68
- Track 12 : Archis\_79, Hitter\_75, ZiggyZoo\_78
- Track 13 : Wocket\_77
- Track 14 : BlingBling\_72
- Track 15 : Gambino\_85, Azula\_83, MissRona\_83, Blueberry\_82
- Track 16 : MintFen\_77, Guacamole\_75, Barco\_74, Delian\_80, CaptainKirk2\_77, JasperJr\_75
- Track 17 : Frokostdame\_82
- Track 18 : Fenry\_76
- Track 19 : Samba\_77
- Track 20 : KappaFarmDelta\_77
- Track 21 : Blino\_79, CarolAnn\_78
- Track 22 : Walrus\_77
- Track 23 : William\_79
- Track 24 : JuJu\_85
- Track 25 : Wisp\_74
- Track 26 : UmaThurman\_80
- Track 27 : Jalammah\_80
- Track 28 : Mellie\_74
- Track 29 : Obliviate\_77
- Track 30 : PhrostedPhlake\_83
- Track 31 : Murp\_75
- Track 32 : BeeGee\_80
- Track 33 : BritBrat\_96
- Track 34 : Pepperoni\_64
- Track 35 : Hortense\_75, Twinkle\_74, Adora\_72, Howe\_75, Shlim410\_73
- Track 36 : DobbysSock\_69

- Track 37 : Denise\_71
- Track 38 : Moosehead\_71
- Track 39 : OneDirection\_65, PhorbesPhlower\_69, Kuwabara\_89, Morkie\_71, Lton\_68
- Track 40 : Lucky10\_67
- Track 41 : Brylie\_72, Ayotoya\_73, Nadeem\_72, WheatThin\_72, Mulch\_72, Parada\_72
- Track 42 : BetterKatz\_73
- Track 43 : GrandSlam\_74, Hamood\_74, Chop\_74
- Track 44 : Bock\_74
- Track 45 : Francois\_73
- Track 46 : NancyRae\_71
- Track 47 : Pimento\_76
- Track 48 : DelRio\_73
- Track 49 : BearBQ\_98
- Track 50 : ODay\_113
- Track 51 : Malisha\_92
- Track 52 : Asapag\_95
- Track 53 : BENtherdunthat\_97, CheeseTouch\_105
- Track 54 : Getalong\_99
- Track 55 : Ruthy\_71
- Track 56 : DumpsterDude\_69
- Track 57 : Malibo\_74
- Track 58 : Heinz\_58
- Track 59 : Tarzan\_59, DonkeyMan\_57
- Track 60 : Reyja\_61
- Track 61 : Hibiscus\_59
- Track 62 : Santhid\_55
- Track 63 : Jojo24\_58
- Track 64 : Pitbull\_74
- Track 65 : Hum25\_72
- Track 66 : MrSmee\_74
- Track 67 : Whack\_70
- Track 68 : GMA4\_62
- Track 69 : Jace\_92
- Track 70 : Sleepyhead\_65

***Summary of Final Annotations (See graph section above for start numbers):***

The start number called the most often in the published annotations is 91, it was called in 63 of the 90 non-draft genes in the pham.

Genes that call this "Most Annotated" start:

• Adora\_72, Archis\_79, Asapag\_95, Azula\_83, BENtherdunthat\_97, Barco\_74, BearBQ\_98, BeeGee\_80, Begonia\_75, BlingBling\_72, Blino\_79, Blueberry\_82, BritBrat\_96, CaptainKirk2\_77, CarolAnn\_78, CheeseTouch\_105, Delian\_80, Denise\_71, DobbysSock\_69, Fairfaxidum\_80, Fenry\_76, Frokostdame\_82, Gambino\_85, Getalong\_99, Guacamole\_75, Hitter\_75, Hortense\_75, Howe\_75, Jalamah\_80, JasperJr\_75, JuJu\_85, KappaFarmDelta\_77, Kuwabara\_89, Lton\_68, Lucky10\_67, Lysidious\_79, Malachai\_75, Malisha\_92, Melba\_77, Mellie\_74,

MintFen\_77, MissRona\_83, Moosehead\_71, Morkie\_71, Murp\_75, ODay\_113, Obliviate\_77, OneDirection\_65, PCoral7\_76, Pepperoni\_64, Petra\_84, PhorbesPhlower\_69, PhrostedPhlake\_83, PrincePatrick\_79, Samba\_77, Shlim410\_73, Toast\_77, Twinkle\_74, UmaThurman\_80, Utz\_68, Walrus\_77, William\_79, Wisp\_74, Wocket\_77, Zarbodnamra\_81, ZiggyZoo\_78,

Genes that have the "Most Annotated" start but do not call it:

- Pipp\_82,

Genes that do not have the "Most Annotated" start:

- Ayotoya\_73, BetterKatz\_73, Bock\_74, Brylie\_72, Chop\_74, DelRio\_73, DonkeyMan\_57, DumpsterDude\_69, Francois\_73, GMA4\_62, GrandSlam\_74, Hamood\_74, Heinz\_58, Hibiscus\_59, Hum25\_72, Jace\_92, Jflix2\_100, Jojo24\_58, Madraxi\_102, Malibo\_74, MrSmee\_74, Mulch\_72, Nadeem\_72, NancyRae\_71, Parada\_72, Pimento\_76, Pitbull\_74, Reyja\_61, Ruthy\_71, Santhid\_55, Shagrat\_105, Sleepyhead\_65, Tarzan\_59, Whack\_70, WheatThin\_72,

### Summary by start number:

Start 64:

- Found in 2 of 102 ( 2.0% ) of genes in pham
- Manual Annotations of this start: 2 of 90
- Called 100.0% of time when present
- Phage (with cluster) where this start called: Sleepyhead\_65 (singleton), Whack\_70 (singleton),

Start 71:

- Found in 7 of 102 ( 6.9% ) of genes in pham
- Manual Annotations of this start: 5 of 90
- Called 100.0% of time when present
- Phage (with cluster) where this start called: DonkeyMan\_57 (DY), Heinz\_58 (DY), Hibiscus\_59 (DY), Jojo24\_58 (DY), Reyja\_61 (DY), Santhid\_55 (DY), Tarzan\_59 (DY),

Start 79:

- Found in 3 of 102 ( 2.9% ) of genes in pham
- Manual Annotations of this start: 3 of 90
- Called 100.0% of time when present
- Phage (with cluster) where this start called: DumpsterDude\_69 (DW), Malibo\_74 (DW), Ruthy\_71 (DW),

Start 80:

- Found in 2 of 102 ( 2.0% ) of genes in pham
- Manual Annotations of this start: 1 of 90
- Called 50.0% of time when present
- Phage (with cluster) where this start called: Francois\_73 (DI),

Start 81:

- Found in 15 of 102 ( 14.7% ) of genes in pham
- Manual Annotations of this start: 12 of 90
- Called 93.3% of time when present
- Phage (with cluster) where this start called: Ayotoya\_73 (DI), BetterKatz\_73 (DI), Bock\_74 (DI), Brylie\_72 (DI), Chop\_74 (DI), DelRio\_73 (DI), GrandSlam\_74 (DI),

Hamood\_74 (DI), Mulch\_72 (DI), Nadeem\_72 (DI), NancyRae\_71 (DI), Parada\_72 (DI), Pimento\_76 (DI), WheatThin\_72 (DI),

Start 86:

- Found in 1 of 102 ( 1.0% ) of genes in pham
- Manual Annotations of this start: 1 of 90
- Called 100.0% of time when present
- Phage (with cluster) where this start called: Jace\_92 (singleton),

Start 88:

- Found in 2 of 102 ( 2.0% ) of genes in pham
- Manual Annotations of this start: 2 of 90
- Called 100.0% of time when present
- Phage (with cluster) where this start called: Pipp\_82 (CV), Shagrat\_105 (CF),

Start 89:

- Found in 1 of 102 ( 1.0% ) of genes in pham
- No Manual Annotations of this start.
- Called 100.0% of time when present
- Phage (with cluster) where this start called: GMA4\_62 (singleton),

Start 90:

- Found in 1 of 102 ( 1.0% ) of genes in pham
- No Manual Annotations of this start.
- Called 100.0% of time when present
- Phage (with cluster) where this start called: Hum25\_72 (FQ),

Start 91:

- Found in 67 of 102 ( 65.7% ) of genes in pham
- Manual Annotations of this start: 63 of 90
- Called 98.5% of time when present
- Phage (with cluster) where this start called: Adora\_72 (CZ4), Archis\_79 (CV), Asapag\_95 (DN1), Azula\_83 (CV), BENtherdunthat\_97 (DN1), Barco\_74 (CV), BearBQ\_98 (DN), BeeGee\_80 (CY), Begonia\_75 (CV), BlingBling\_72 (CV), Blino\_79 (CV), Blueberry\_82 (CV), BritBrat\_96 (CY2), CaptainKirk2\_77 (CV), CarolAnn\_78 (CV), CheeseTouch\_105 (DN1), Delian\_80 (CV), Denise\_71 (CZ5), DobbysSock\_69 (CZ4), Fairfaxidum\_80 (CV), Fenry\_76 (CV), Frokostdame\_82 (CV), Gambino\_85 (CV), Getalong\_99 (DN1), Guacamole\_75 (CV), Hitter\_75 (CV), Hortense\_75 (CZ4), Howe\_75 (CZ4), Jalammah\_80 (CV), JasperJr\_75 (CV), JuJu\_85 (CV), KappaFarmDelta\_77 (CV), Kuwabara\_89 (DN4), Lton\_68 (CZ), Lucky10\_67 (DH), Lysidious\_79 (CV), Malachai\_75 (CV), Malisha\_92 (DN), Melba\_77 (CV), Mellie\_74 (CV), MintFen\_77 (CV), MissRona\_83 (CV), Moosehead\_71 (CZ6), Morkie\_71 (DH), Murp\_75 (CV), ODay\_113 (DN), Obliviate\_77 (CV), OneDirection\_65 (CZ6), PCoral7\_76 (CV), Pepperoni\_64 (CZ), Petra\_84 (CV), PhorbesPhlower\_69 (DH), PhrostedPhlake\_83 (CV), PrincePatrick\_79 (CV), Samba\_77 (CV), Shlim410\_73 (CZ4), Toast\_77 (CV), Twinkle\_74 (CZ4), UmaThurman\_80 (CV), Utz\_68 (CV), Walrus\_77 (CV), William\_79 (CV), Wisp\_74 (CV), Wocket\_77 (CV), Zarbodnamra\_81 (CV), ZiggyZoo\_78 (CV),

Start 92:

- Found in 1 of 102 ( 1.0% ) of genes in pham
- No Manual Annotations of this start.
- Called 100.0% of time when present

- Phage (with cluster) where this start called: MrSmee\_74 (UNK),

Start 94:

- Found in 2 of 102 ( 2.0% ) of genes in pham
- No Manual Annotations of this start.
- Called 50.0% of time when present
- Phage (with cluster) where this start called: Pitbull\_74 (FQ),

Start 96:

- Found in 2 of 102 ( 2.0% ) of genes in pham
- Manual Annotations of this start: 1 of 90
- Called 100.0% of time when present
- Phage (with cluster) where this start called: Jflix2\_100 (CF), Madraxi\_102 (CF),

### **Summary by clusters:**

There are 18 clusters represented in this pham: DN, CY2, singleton, DH, DI, CZ6, CF, CZ4, CZ5, DN4, CY, FQ, DN1, DY, CZ, DW, UNK, CV,

Info for manual annotations of cluster CF:

- Start number 88 was manually annotated 1 time for cluster CF.
- Start number 96 was manually annotated 1 time for cluster CF.

Info for manual annotations of cluster CV:

- Start number 88 was manually annotated 1 time for cluster CV.
- Start number 91 was manually annotated 40 times for cluster CV.

Info for manual annotations of cluster CY:

- Start number 91 was manually annotated 1 time for cluster CY.

Info for manual annotations of cluster CY2:

- Start number 91 was manually annotated 1 time for cluster CY2.

Info for manual annotations of cluster CZ:

- Start number 91 was manually annotated 1 time for cluster CZ.

Info for manual annotations of cluster CZ4:

- Start number 91 was manually annotated 6 times for cluster CZ4.

Info for manual annotations of cluster CZ5:

- Start number 91 was manually annotated 1 time for cluster CZ5.

Info for manual annotations of cluster CZ6:

- Start number 91 was manually annotated 2 times for cluster CZ6.

Info for manual annotations of cluster DH:

- Start number 91 was manually annotated 3 times for cluster DH.

Info for manual annotations of cluster DI:

- Start number 80 was manually annotated 1 time for cluster DI.
- Start number 81 was manually annotated 12 times for cluster DI.

Info for manual annotations of cluster DN:

- Start number 91 was manually annotated 3 times for cluster DN.

Info for manual annotations of cluster DN1:

- Start number 91 was manually annotated 4 times for cluster DN1.

Info for manual annotations of cluster DN4:

- Start number 91 was manually annotated 1 time for cluster DN4.

Info for manual annotations of cluster DW:

- Start number 79 was manually annotated 3 times for cluster DW.

Info for manual annotations of cluster DY:

- Start number 71 was manually annotated 5 times for cluster DY.

### ***Gene Information:***

Gene: Adora\_72 Start: 48969, Stop: 49706, Start Num: 91

Candidate Starts for Adora\_72:

(38, 48723), (65, 48870), (78, 48912), (Start: 91 @48969 has 63 MA's), (101, 49011), (103, 49044), (118, 49125), (119, 49128), (141, 49275), (159, 49425), (174, 49506), (179, 49518),

Gene: Archis\_79 Start: 46629, Stop: 47405, Start Num: 91

Candidate Starts for Archis\_79:

(40, 46410), (Start: 91 @46629 has 63 MA's), (118, 46806), (131, 46878), (141, 46956), (143, 46968), (154, 47076), (192, 47262), (196, 47271), (201, 47295),

Gene: Asapag\_95 Start: 52545, Stop: 53270, Start Num: 91

Candidate Starts for Asapag\_95:

(Start: 91 @52545 has 63 MA's), (108, 52656), (138, 52833), (158, 52983), (159, 52998), (174, 53079), (178, 53088), (179, 53091), (187, 53133), (205, 53199), (210, 53244), (211, 53247),

Gene: Ayotoya\_73 Start: 49136, Stop: 50011, Start Num: 81

Candidate Starts for Ayotoya\_73:

(42, 48965), (68, 49097), (77, 49130), (Start: 81 @49136 has 12 MA's), (98, 49229), (117, 49376), (129, 49445), (132, 49460), (160, 49700), (181, 49799), (203, 49886), (216, 49994),

Gene: Azula\_83 Start: 51089, Stop: 51874, Start Num: 91

Candidate Starts for Azula\_83:

(54, 50924), (Start: 91 @51089 has 63 MA's), (118, 51272), (143, 51434), (154, 51542), (192, 51728), (196, 51737),

Gene: BENtherdunthat\_97 Start: 52077, Stop: 52805, Start Num: 91

Candidate Starts for BENtherdunthat\_97:

(Start: 91 @52077 has 63 MA's), (103, 52152), (159, 52527), (162, 52548), (163, 52551), (170, 52575), (178, 52617), (179, 52620), (187, 52662), (188, 52665), (189, 52668), (190, 52671), (194, 52686), (198, 52698), (199, 52701), (209, 52767), (210, 52773),

Gene: Barco\_74 Start: 46443, Stop: 47219, Start Num: 91

Candidate Starts for Barco\_74:



(Start: 91 @46443 has 63 MA's), (118, 46620), (131, 46692), (136, 46749), (138, 46755), (141, 46770), (143, 46782), (154, 46890), (192, 47076), (196, 47085),

Gene: BearBQ\_98 Start: 53192, Stop: 53920, Start Num: 91

Candidate Starts for BearBQ\_98:

(85, 53159), (Start: 91 @53192 has 63 MA's), (103, 53267), (134, 53450), (159, 53642), (163, 53666), (170, 53690), (178, 53732), (179, 53735), (187, 53777), (188, 53780), (189, 53783), (190, 53786), (194, 53801), (198, 53813), (199, 53816), (209, 53882), (210, 53888),

Gene: BeeGee\_80 Start: 50088, Stop: 50837, Start Num: 91

Candidate Starts for BeeGee\_80:

(66, 49998), (Start: 91 @50088 has 63 MA's), (119, 50253), (127, 50301), (155, 50532), (158, 50541), (174, 50637), (178, 50646), (179, 50649),

Gene: Begonia\_75 Start: 49240, Stop: 50016, Start Num: 91

Candidate Starts for Begonia\_75:

(27, 48943), (40, 49021), (Start: 91 @49240 has 63 MA's), (118, 49417), (141, 49567), (143, 49579), (154, 49687), (192, 49873), (196, 49882),

Gene: BetterKatz\_73 Start: 48918, Stop: 49793, Start Num: 81

Candidate Starts for BetterKatz\_73:

(36, 48711), (Start: 81 @48918 has 12 MA's), (98, 49011), (117, 49158), (129, 49227), (132, 49242), (160, 49482), (181, 49581), (192, 49629), (203, 49668), (216, 49776),

Gene: BlingBling\_72 Start: 46215, Stop: 46991, Start Num: 91

Candidate Starts for BlingBling\_72:

(Start: 91 @46215 has 63 MA's), (118, 46392), (131, 46464), (143, 46554), (154, 46662), (192, 46848), (196, 46857),

Gene: Blino\_79 Start: 52044, Stop: 52805, Start Num: 91

Candidate Starts for Blino\_79:

(Start: 91 @52044 has 63 MA's), (118, 52221), (124, 52260), (130, 52284), (131, 52293), (143, 52383), (154, 52491), (192, 52677), (196, 52686),

Gene: Blueberry\_82 Start: 51089, Stop: 51874, Start Num: 91

Candidate Starts for Blueberry\_82:

(54, 50924), (Start: 91 @51089 has 63 MA's), (118, 51272), (143, 51434), (154, 51542), (192, 51728), (196, 51737),

Gene: Bock\_74 Start: 48502, Stop: 49377, Start Num: 81

Candidate Starts for Bock\_74:

(29, 48271), (30, 48274), (48, 48349), (56, 48400), (60, 48421), (Start: 81 @48502 has 12 MA's), (98, 48595), (117, 48742), (129, 48811), (132, 48826), (160, 49066), (176, 49144), (181, 49165), (192, 49213), (203, 49252), (216, 49360),

Gene: BritBrat\_96 Start: 54041, Stop: 54766, Start Num: 91

Candidate Starts for BritBrat\_96:

(25, 53711), (53, 53873), (72, 53969), (Start: 91 @54041 has 63 MA's), (103, 54116), (108, 54152), (159, 54494), (171, 54563), (174, 54575), (179, 54587), (210, 54740), (211, 54743),

Gene: Brylie\_72 Start: 48152, Stop: 49027, Start Num: 81

Candidate Starts for Brylie\_72:

(42, 47981), (68, 48113), (77, 48146), (Start: 81 @48152 has 12 MA's), (98, 48245), (117, 48392), (129, 48461), (132, 48476), (160, 48716), (181, 48815), (203, 48902), (216, 49010),

Gene: CaptainKirk2\_77 Start: 46000, Stop: 46776, Start Num: 91

Candidate Starts for CaptainKirk2\_77:

(Start: 91 @46000 has 63 MA's), (118, 46177), (131, 46249), (136, 46306), (138, 46312), (141, 46327), (143, 46339), (154, 46447), (192, 46633), (196, 46642),

Gene: CarolAnn\_78 Start: 52043, Stop: 52804, Start Num: 91

Candidate Starts for CarolAnn\_78:

(Start: 91 @52043 has 63 MA's), (118, 52220), (124, 52259), (130, 52283), (131, 52292), (143, 52382), (154, 52490), (192, 52676), (196, 52685),

Gene: CheeseTouch\_105 Start: 51190, Stop: 51918, Start Num: 91

Candidate Starts for CheeseTouch\_105:

(Start: 91 @51190 has 63 MA's), (103, 51265), (159, 51640), (162, 51661), (163, 51664), (170, 51688), (178, 51730), (179, 51733), (187, 51775), (188, 51778), (189, 51781), (190, 51784), (194, 51799), (198, 51811), (199, 51814), (209, 51880), (210, 51886),

Gene: Chop\_74 Start: 49201, Stop: 50076, Start Num: 81

Candidate Starts for Chop\_74:

(42, 49030), (68, 49162), (77, 49195), (Start: 81 @49201 has 12 MA's), (98, 49294), (117, 49441), (129, 49510), (132, 49525), (160, 49765), (181, 49864), (192, 49912), (203, 49951), (216, 50059),

Gene: DelRio\_73 Start: 49243, Stop: 50118, Start Num: 81

Candidate Starts for DelRio\_73:

(42, 49072), (57, 49147), (68, 49204), (77, 49237), (Start: 81 @49243 has 12 MA's), (98, 49336), (117, 49483), (129, 49552), (132, 49567), (160, 49807), (169, 49846), (181, 49906), (192, 49954), (203, 49993), (216, 50101),

Gene: Delian\_80 Start: 45998, Stop: 46774, Start Num: 91

Candidate Starts for Delian\_80:

(Start: 91 @45998 has 63 MA's), (118, 46175), (131, 46247), (136, 46304), (138, 46310), (141, 46325), (143, 46337), (154, 46445), (192, 46631), (196, 46640),

Gene: Denise\_71 Start: 41520, Stop: 42272, Start Num: 91

Candidate Starts for Denise\_71:

(Start: 91 @41520 has 63 MA's), (114, 41658), (121, 41715), (157, 41973), (180, 42087), (187, 42126), (189, 42132), (196, 42156), (202, 42183), (208, 42234),

Gene: DobbysSock\_69 Start: 45937, Stop: 46674, Start Num: 91

Candidate Starts for DobbysSock\_69:

(Start: 91 @45937 has 63 MA's), (101, 45979), (103, 46012), (119, 46096), (141, 46243), (159, 46393), (174, 46474), (179, 46486),

Gene: DonkeyMan\_57 Start: 38622, Stop: 39494, Start Num: 71

Candidate Starts for DonkeyMan\_57:

(Start: 71 @38622 has 5 MA's), (73, 38634), (113, 38847), (177, 39276), (208, 39426), (212, 39441),

Gene: DumpsterDude\_69 Start: 50376, Stop: 51257, Start Num: 79

Candidate Starts for DumpsterDude\_69:

(12, 49788), (15, 49821), (22, 50073), (28, 50124), (Start: 79 @50376 has 3 MA's),

Gene: Fairfaxidum\_80 Start: 48694, Stop: 49470, Start Num: 91  
Candidate Starts for Fairfaxidum\_80:  
(Start: 91 @48694 has 63 MA's), (118, 48874), (130, 48937), (131, 48946), (143, 49036), (187, 49309), (192, 49330), (196, 49339), (208, 49417),

Gene: Fenry\_76 Start: 48068, Stop: 48844, Start Num: 91  
Candidate Starts for Fenry\_76:  
(40, 47849), (59, 47936), (Start: 91 @48068 has 63 MA's), (114, 48212), (118, 48245), (131, 48317), (136, 48374), (141, 48395), (143, 48407), (154, 48515), (192, 48701), (196, 48710),

Gene: Francois\_73 Start: 48813, Stop: 49691, Start Num: 80  
Candidate Starts for Francois\_73:  
(Start: 80 @48813 has 1 MA's), (129, 49125), (132, 49140), (160, 49380), (192, 49527), (203, 49566), (216, 49674),

Gene: Frokostdame\_82 Start: 50554, Stop: 51336, Start Num: 91  
Candidate Starts for Frokostdame\_82:  
(54, 50389), (Start: 91 @50554 has 63 MA's), (118, 50737), (143, 50899), (154, 51007), (192, 51193), (196, 51202), (208, 51280),

Gene: GMA4\_62 Start: 40731, Stop: 41486, Start Num: 89  
Candidate Starts for GMA4\_62:  
(24, 40401), (89, 40731), (149, 41109), (173, 41280), (179, 41298), (189, 41346),

Gene: Gambino\_85 Start: 51089, Stop: 51874, Start Num: 91  
Candidate Starts for Gambino\_85:  
(54, 50924), (Start: 91 @51089 has 63 MA's), (118, 51272), (143, 51434), (154, 51542), (192, 51728), (196, 51737),

Gene: Getalong\_99 Start: 53422, Stop: 54150, Start Num: 91  
Candidate Starts for Getalong\_99:  
(Start: 91 @53422 has 63 MA's), (103, 53497), (134, 53680), (159, 53872), (163, 53896), (167, 53908), (170, 53920), (178, 53962), (179, 53965), (187, 54007), (188, 54010), (189, 54013), (190, 54016), (194, 54031), (198, 54043), (199, 54046), (209, 54112), (210, 54118),

Gene: GrandSlam\_74 Start: 49201, Stop: 50076, Start Num: 81  
Candidate Starts for GrandSlam\_74:  
(42, 49030), (68, 49162), (77, 49195), (Start: 81 @49201 has 12 MA's), (98, 49294), (117, 49441), (129, 49510), (132, 49525), (160, 49765), (181, 49864), (192, 49912), (203, 49951), (216, 50059),

Gene: Guacamole\_75 Start: 47418, Stop: 48194, Start Num: 91  
Candidate Starts for Guacamole\_75:  
(Start: 91 @47418 has 63 MA's), (118, 47595), (131, 47667), (136, 47724), (138, 47730), (141, 47745), (143, 47757), (154, 47865), (192, 48051), (196, 48060),

Gene: Hamood\_74 Start: 49201, Stop: 50076, Start Num: 81  
Candidate Starts for Hamood\_74:  
(42, 49030), (68, 49162), (77, 49195), (Start: 81 @49201 has 12 MA's), (98, 49294), (117, 49441), (129, 49510), (132, 49525), (160, 49765), (181, 49864), (192, 49912), (203, 49951), (216, 50059),

Gene: Heinz\_58 Start: 37588, Stop: 38469, Start Num: 71  
Candidate Starts for Heinz\_58:  
(Start: 71 @37588 has 5 MA's), (177, 38251), (208, 38401), (211, 38413),

Gene: Hibiscus\_59 Start: 37479, Stop: 38351, Start Num: 71

Candidate Starts for Hibiscus\_59:

(20, 37173), (42, 37335), (43, 37341), (49, 37359), (50, 37380), (59, 37425), (Start: 71 @37479 has 5 MA's), (177, 38133), (208, 38283), (212, 38298),

Gene: Hitter\_75 Start: 45674, Stop: 46450, Start Num: 91

Candidate Starts for Hitter\_75:

(40, 45455), (Start: 91 @45674 has 63 MA's), (118, 45851), (131, 45923), (141, 46001), (143, 46013), (154, 46121), (192, 46307), (196, 46316), (201, 46340),

Gene: Hortense\_75 Start: 50324, Stop: 51061, Start Num: 91

Candidate Starts for Hortense\_75:

(38, 50078), (65, 50225), (78, 50267), (Start: 91 @50324 has 63 MA's), (101, 50366), (103, 50399), (118, 50480), (119, 50483), (141, 50630), (159, 50780), (174, 50861), (179, 50873),

Gene: Howe\_75 Start: 50324, Stop: 51061, Start Num: 91

Candidate Starts for Howe\_75:

(38, 50078), (65, 50225), (78, 50267), (Start: 91 @50324 has 63 MA's), (101, 50366), (103, 50399), (118, 50480), (119, 50483), (141, 50630), (159, 50780), (174, 50861), (179, 50873),

Gene: Hum25\_72 Start: 39455, Stop: 40183, Start Num: 90

Candidate Starts for Hum25\_72:

(83, 39410), (90, 39455), (104, 39554), (105, 39560), (107, 39581), (109, 39584), (120, 39635), (140, 39773), (145, 39803), (156, 39905), (164, 39959), (191, 40070), (211, 40166),

Gene: Jace\_92 Start: 51606, Stop: 52397, Start Num: 86

Candidate Starts for Jace\_92:

(67, 51519), (Start: 86 @51606 has 1 MA's), (93, 51627), (110, 51756), (112, 51765), (164, 52119), (183, 52203), (184, 52206), (197, 52257), (208, 52320), (210, 52329), (215, 52377),

Gene: Jalammah\_80 Start: 49580, Stop: 50356, Start Num: 91

Candidate Starts for Jalammah\_80:

(51, 49415), (59, 49448), (Start: 91 @49580 has 63 MA's), (118, 49757), (131, 49829), (136, 49886), (141, 49907), (143, 49919), (154, 50027), (192, 50213), (196, 50222),

Gene: JasperJr\_75 Start: 47418, Stop: 48194, Start Num: 91

Candidate Starts for JasperJr\_75:

(Start: 91 @47418 has 63 MA's), (118, 47595), (131, 47667), (136, 47724), (138, 47730), (141, 47745), (143, 47757), (154, 47865), (192, 48051), (196, 48060),

Gene: Jflix2\_100 Start: 57187, Stop: 57882, Start Num: 96

Candidate Starts for Jflix2\_100:

(Start: 96 @57187 has 1 MA's), (99, 57205), (103, 57244), (110, 57286), (118, 57328), (122, 57364), (135, 57436), (143, 57484), (151, 57559), (160, 57625), (177, 57706), (185, 57742), (193, 57775), (195, 57778), (205, 57814), (206, 57835), (213, 57874),

Gene: Jojo24\_58 Start: 37912, Stop: 38784, Start Num: 71

Candidate Starts for Jojo24\_58:

(50, 37819), (58, 37858), (Start: 71 @37912 has 5 MA's), (113, 38137), (177, 38566), (208, 38716), (212, 38731),

Gene: JuJu\_85 Start: 51321, Stop: 52103, Start Num: 91

Candidate Starts for JuJu\_85:

(Start: 91 @51321 has 63 MA's), (118, 51504), (143, 51666), (154, 51774), (192, 51960), (196, 51969),

Gene: KappaFarmDelta\_77 Start: 47260, Stop: 48036, Start Num: 91

Candidate Starts for KappaFarmDelta\_77:

(21, 46912), (23, 46924), (50, 47086), (51, 47095), (Start: 91 @47260 has 63 MA's), (118, 47437), (131, 47509), (136, 47566), (141, 47587), (143, 47599), (154, 47707), (192, 47893), (196, 47902), (201, 47926),

Gene: Kuwabara\_89 Start: 52072, Stop: 52815, Start Num: 91

Candidate Starts for Kuwabara\_89:

(52, 51901), (Start: 91 @52072 has 63 MA's), (119, 52237), (159, 52534), (174, 52615), (178, 52624), (179, 52627),

Gene: Lton\_68 Start: 39225, Stop: 39968, Start Num: 91

Candidate Starts for Lton\_68:

(52, 39054), (Start: 91 @39225 has 63 MA's), (119, 39390), (159, 39687), (174, 39768), (178, 39777), (179, 39780),

Gene: Lucky10\_67 Start: 41325, Stop: 42068, Start Num: 91

Candidate Starts for Lucky10\_67:

(46, 41145), (74, 41274), (76, 41277), (Start: 91 @41325 has 63 MA's), (103, 41406), (119, 41490), (121, 41514), (159, 41787), (174, 41868), (178, 41877), (179, 41880),

Gene: Lysidious\_79 Start: 48328, Stop: 49104, Start Num: 91

Candidate Starts for Lysidious\_79:

(26, 48028), (35, 48079), (51, 48163), (59, 48196), (Start: 91 @48328 has 63 MA's), (118, 48505), (131, 48577), (136, 48634), (141, 48655), (143, 48667), (154, 48775), (192, 48961), (196, 48970), (201, 48994),

Gene: Madraxi\_102 Start: 59347, Stop: 60069, Start Num: 96

Candidate Starts for Madraxi\_102:

(Start: 96 @59347 has 1 MA's), (99, 59365), (103, 59404), (110, 59446), (118, 59488), (122, 59524), (126, 59536), (135, 59596), (148, 59671), (177, 59866), (189, 59917), (195, 59938), (204, 59968), (214, 60040),

Gene: Malachai\_75 Start: 49240, Stop: 50016, Start Num: 91

Candidate Starts for Malachai\_75:

(27, 48943), (40, 49021), (Start: 91 @49240 has 63 MA's), (118, 49417), (141, 49567), (143, 49579), (154, 49687), (192, 49873), (196, 49882),

Gene: Malibo\_74 Start: 48036, Stop: 48914, Start Num: 79

Candidate Starts for Malibo\_74:

(16, 47619), (Start: 79 @48036 has 3 MA's), (129, 48348),

Gene: Malisha\_92 Start: 53316, Stop: 54062, Start Num: 91

Candidate Starts for Malisha\_92:

(Start: 80 @53265 has 1 MA's), (Start: 81 @53268 has 12 MA's), (Start: 91 @53316 has 63 MA's), (110, 53430), (142, 53634), (157, 53763), (169, 53829), (180, 53877), (181, 53889), (196, 53946), (208, 54024),

Gene: Melba\_77 Start: 46375, Stop: 47151, Start Num: 91

Candidate Starts for Melba\_77:

(50, 46201), (Start: 91 @46375 has 63 MA's), (118, 46552), (131, 46624), (141, 46702), (143, 46714), (154, 46822), (192, 47008), (196, 47017), (201, 47041),

Gene: Mellie\_74 Start: 46392, Stop: 47168, Start Num: 91

Candidate Starts for Mellie\_74:

(Start: 91 @46392 has 63 MA's), (106, 46497), (118, 46569), (143, 46731), (192, 47025), (196, 47034),

Gene: MintFen\_77 Start: 46614, Stop: 47390, Start Num: 91

Candidate Starts for MintFen\_77:

(Start: 91 @46614 has 63 MA's), (118, 46791), (131, 46863), (136, 46920), (138, 46926), (141, 46941), (143, 46953), (154, 47061), (192, 47247), (196, 47256),

Gene: MissRona\_83 Start: 51090, Stop: 51875, Start Num: 91

Candidate Starts for MissRona\_83:

(54, 50925), (Start: 91 @51090 has 63 MA's), (118, 51273), (143, 51435), (154, 51543), (192, 51729), (196, 51738),

Gene: Moosehead\_71 Start: 39747, Stop: 40490, Start Num: 91

Candidate Starts for Moosehead\_71:

(74, 39696), (76, 39699), (Start: 91 @39747 has 63 MA's), (119, 39912), (121, 39936), (174, 40290), (179, 40302), (188, 40347),

Gene: Morkie\_71 Start: 40373, Stop: 41116, Start Num: 91

Candidate Starts for Morkie\_71:

(52, 40202), (Start: 91 @40373 has 63 MA's), (119, 40538), (159, 40835), (174, 40916), (178, 40925), (179, 40928),

Gene: MrSmee\_74 Start: 39014, Stop: 39739, Start Num: 92

Candidate Starts for MrSmee\_74:

(92, 39014), (94, 39017), (104, 39107), (107, 39134), (109, 39137), (120, 39188), (124, 39221), (140, 39326), (145, 39356), (148, 39374), (160, 39491), (168, 39524), (191, 39626), (201, 39659), (211, 39722),

Gene: Mulch\_72 Start: 48191, Stop: 49066, Start Num: 81

Candidate Starts for Mulch\_72:

(42, 48020), (68, 48152), (77, 48185), (Start: 81 @48191 has 12 MA's), (98, 48284), (117, 48431), (129, 48500), (132, 48515), (160, 48755), (181, 48854), (203, 48941), (216, 49049),

Gene: Murp\_75 Start: 49491, Stop: 50267, Start Num: 91

Candidate Starts for Murp\_75:

(51, 49326), (Start: 91 @49491 has 63 MA's), (106, 49596), (118, 49668), (131, 49740), (136, 49797), (141, 49818), (143, 49830), (154, 49938), (192, 50124), (196, 50133),

Gene: Nadeem\_72 Start: 48179, Stop: 49054, Start Num: 81

Candidate Starts for Nadeem\_72:

(42, 48008), (68, 48140), (77, 48173), (Start: 81 @48179 has 12 MA's), (98, 48272), (117, 48419), (129, 48488), (132, 48503), (160, 48743), (181, 48842), (203, 48929), (216, 49037),

Gene: NancyRae\_71 Start: 48057, Stop: 48932, Start Num: 81

Candidate Starts for NancyRae\_71:

(62, 47997), (77, 48051), (Start: 81 @48057 has 12 MA's), (98, 48150), (117, 48297), (129, 48366), (132, 48381), (160, 48621), (181, 48720), (192, 48768), (203, 48807), (216, 48915),

Gene: ODay\_113 Start: 56624, Stop: 57352, Start Num: 91

Candidate Starts for ODay\_113:

(82, 56576), (87, 56612), (Start: 91 @56624 has 63 MA's), (103, 56699), (119, 56777), (159, 57074), (163, 57098), (170, 57122), (178, 57164), (179, 57167), (186, 57200), (187, 57209), (188, 57212), (189, 57215), (190, 57218), (194, 57233), (198, 57245), (199, 57248), (209, 57314), (210, 57320),

Gene: Obliviate\_77 Start: 46932, Stop: 47708, Start Num: 91

Candidate Starts for Obliviate\_77:

(50, 46752), (Start: 91 @46932 has 63 MA's), (114, 47076), (118, 47109), (131, 47181), (141, 47259), (143, 47271), (154, 47379), (192, 47565), (196, 47574),

Gene: OneDirection\_65 Start: 37787, Stop: 38530, Start Num: 91

Candidate Starts for OneDirection\_65:

(52, 37616), (Start: 91 @37787 has 63 MA's), (119, 37952), (159, 38249), (174, 38330), (178, 38339), (179, 38342),

Gene: PCoral7\_76 Start: 47524, Stop: 48300, Start Num: 91

Candidate Starts for PCoral7\_76:

(Start: 91 @47524 has 63 MA's), (118, 47704), (130, 47767), (131, 47776), (143, 47866), (187, 48139), (192, 48160), (196, 48169), (208, 48247),

Gene: Parada\_72 Start: 48191, Stop: 49066, Start Num: 81

Candidate Starts for Parada\_72:

(42, 48020), (68, 48152), (77, 48185), (Start: 81 @48191 has 12 MA's), (98, 48284), (117, 48431), (129, 48500), (132, 48515), (160, 48755), (181, 48854), (203, 48941), (216, 49049),

Gene: Pepperoni\_64 Start: 38913, Stop: 39656, Start Num: 91

Candidate Starts for Pepperoni\_64:

(Start: 91 @38913 has 63 MA's), (119, 39078), (159, 39375), (174, 39456), (178, 39465), (179, 39468),

Gene: Petra\_84 Start: 49488, Stop: 50267, Start Num: 91

Candidate Starts for Petra\_84:

(25, 49173), (34, 49230), (45, 49281), (59, 49356), (Start: 91 @49488 has 63 MA's), (118, 49665), (143, 49827), (154, 49935), (192, 50121), (196, 50130), (201, 50154),

Gene: PhorbesPhlower\_69 Start: 39768, Stop: 40511, Start Num: 91

Candidate Starts for PhorbesPhlower\_69:

(52, 39597), (Start: 91 @39768 has 63 MA's), (119, 39933), (159, 40230), (174, 40311), (178, 40320), (179, 40323),

Gene: PhrostedPhlake\_83 Start: 49071, Stop: 49847, Start Num: 91

Candidate Starts for PhrostedPhlake\_83:

(51, 48906), (Start: 91 @49071 has 63 MA's), (118, 49248), (143, 49410), (154, 49518), (192, 49704), (196, 49713),

Gene: Pimento\_76 Start: 48276, Stop: 49151, Start Num: 81

Candidate Starts for Pimento\_76:

(32, 48075), (33, 48078), (Start: 81 @48276 has 12 MA's), (98, 48369), (125, 48570), (129, 48585), (132, 48600), (160, 48840), (181, 48939), (192, 48987), (203, 49026), (216, 49134),

Gene: Pipp\_82 Start: 48884, Stop: 49675, Start Num: 88

Candidate Starts for Pipp\_82:

(37, 48650), (40, 48665), (41, 48671), (51, 48728), (Start: 88 @48884 has 2 MA's), (Start: 91 @48893 has 63 MA's), (118, 49076), (141, 49226), (192, 49532), (196, 49541), (201, 49565),

Gene: Pitbull\_74 Start: 38878, Stop: 39600, Start Num: 94

Candidate Starts for Pitbull\_74:

(39, 38620), (46, 38650), (59, 38725), (63, 38758), (69, 38773), (70, 38782), (94, 38878), (97, 38908), (104, 38968), (107, 38995), (109, 38998), (120, 39049), (128, 39097), (140, 39187), (157, 39325), (160, 39352), (168, 39385), (191, 39487), (201, 39520), (211, 39583),

Gene: PrincePatrick\_79 Start: 47344, Stop: 48120, Start Num: 91

Candidate Starts for PrincePatrick\_79:

(Start: 91 @47344 has 63 MA's), (118, 47524), (130, 47587), (131, 47596), (143, 47686), (187, 47959), (192, 47980), (196, 47989), (208, 48067),

Gene: Reyja\_61 Start: 39095, Stop: 39976, Start Num: 71

Candidate Starts for Reyja\_61:

(59, 39041), (Start: 71 @39095 has 5 MA's), (177, 39758), (208, 39908), (212, 39923),

Gene: Ruthy\_71 Start: 49474, Stop: 50355, Start Num: 79

Candidate Starts for Ruthy\_71:

(10, 48862), (14, 48916), (28, 49222), (Start: 79 @49474 has 3 MA's), (129, 49786),

Gene: Samba\_77 Start: 49525, Stop: 50301, Start Num: 91

Candidate Starts for Samba\_77:

(40, 49306), (Start: 91 @49525 has 63 MA's), (118, 49702), (131, 49774), (136, 49831), (141, 49852), (143, 49864), (154, 49972), (192, 50158), (196, 50167), (201, 50191), (208, 50245),

Gene: Santhid\_55 Start: 36515, Stop: 37387, Start Num: 71

Candidate Starts for Santhid\_55:

(9, 35897), (18, 36176), (19, 36209), (30, 36305), (62, 36476), (Start: 71 @36515 has 5 MA's), (113, 36740), (138, 36911), (177, 37169), (208, 37319), (212, 37334),

Gene: Shagrat\_105 Start: 54894, Stop: 55640, Start Num: 88

Candidate Starts for Shagrat\_105:

(31, 54600), (68, 54804), (75, 54837), (Start: 88 @54894 has 2 MA's), (97, 54939), (100, 54954), (102, 54969), (124, 55119), (137, 55200), (146, 55236), (149, 55272), (152, 55299), (164, 55386), (165, 55389), (175, 55437), (182, 55467), (185, 55479), (188, 55491), (195, 55515),

Gene: Shlim410\_73 Start: 50324, Stop: 51061, Start Num: 91

Candidate Starts for Shlim410\_73:

(38, 50078), (65, 50225), (78, 50267), (Start: 91 @50324 has 63 MA's), (101, 50366), (103, 50399), (118, 50480), (119, 50483), (141, 50630), (159, 50780), (174, 50861), (179, 50873),

Gene: Sleepyhead\_65 Start: 41971, Stop: 42924, Start Num: 64

Candidate Starts for Sleepyhead\_65:

(Start: 64 @41971 has 2 MA's), (95, 42088), (98, 42118), (115, 42250), (116, 42268), (133, 42391), (144, 42454), (147, 42478), (161, 42616), (171, 42670), (172, 42673),

Gene: Tarzan\_59 Start: 37877, Stop: 38749, Start Num: 71

Candidate Starts for Tarzan\_59:



(Start: 71 @37877 has 5 MA's), (73, 37889), (113, 38102), (177, 38531), (208, 38681), (212, 38696),

Gene: Toast\_77 Start: 47524, Stop: 48300, Start Num: 91

Candidate Starts for Toast\_77:

(Start: 91 @47524 has 63 MA's), (118, 47704), (130, 47767), (131, 47776), (143, 47866), (187, 48139), (192, 48160), (196, 48169), (208, 48247),

Gene: Twinkle\_74 Start: 51383, Stop: 52120, Start Num: 91

Candidate Starts for Twinkle\_74:

(38, 51137), (65, 51284), (78, 51326), (Start: 91 @51383 has 63 MA's), (101, 51425), (103, 51458), (118, 51539), (119, 51542), (141, 51689), (159, 51839), (174, 51920), (179, 51932),

Gene: UmaThurman\_80 Start: 47661, Stop: 48437, Start Num: 91

Candidate Starts for UmaThurman\_80:

(Start: 91 @47661 has 63 MA's), (118, 47838), (131, 47910), (136, 47967), (138, 47973), (141, 47988), (143, 48000), (154, 48108), (192, 48294), (196, 48303),

Gene: Utz\_68 Start: 47303, Stop: 48079, Start Num: 91

Candidate Starts for Utz\_68:

(35, 47054), (Start: 91 @47303 has 63 MA's), (118, 47480), (131, 47552), (136, 47609), (138, 47615), (141, 47630), (143, 47642), (154, 47750), (192, 47936), (196, 47945),

Gene: Walrus\_77 Start: 48349, Stop: 49125, Start Num: 91

Candidate Starts for Walrus\_77:

(25, 48034), (45, 48142), (47, 48151), (59, 48217), (61, 48223), (Start: 91 @48349 has 63 MA's), (118, 48526), (143, 48688), (154, 48796), (192, 48982), (196, 48991),

Gene: Whack\_70 Start: 45809, Stop: 46741, Start Num: 64

Candidate Starts for Whack\_70:

(1, 44903), (2, 44915), (3, 44963), (4, 44984), (5, 45032), (6, 45044), (7, 45050), (8, 45080), (11, 45239), (13, 45278), (17, 45455), (44, 45686), (55, 45746), (58, 45764), (Start: 64 @45809 has 2 MA's), (84, 45875), (87, 45905), (98, 45956), (111, 46067), (123, 46148), (139, 46259), (144, 46286), (150, 46349), (153, 46376), (161, 46448), (171, 46502), (172, 46505), (200, 46616), (207, 46670), (211, 46691),

Gene: WheatThin\_72 Start: 48179, Stop: 49054, Start Num: 81

Candidate Starts for WheatThin\_72:

(42, 48008), (68, 48140), (77, 48173), (Start: 81 @48179 has 12 MA's), (98, 48272), (117, 48419), (129, 48488), (132, 48503), (160, 48743), (181, 48842), (203, 48929), (216, 49037),

Gene: William\_79 Start: 48596, Stop: 49372, Start Num: 91

Candidate Starts for William\_79:

(17, 48164), (Start: 91 @48596 has 63 MA's), (118, 48776), (187, 49211), (192, 49232), (196, 49241), (208, 49319),

Gene: Wisp\_74 Start: 47248, Stop: 48024, Start Num: 91

Candidate Starts for Wisp\_74:

(59, 47116), (Start: 91 @47248 has 63 MA's), (118, 47425), (131, 47497), (141, 47575), (143, 47587), (154, 47695), (166, 47761), (192, 47881), (196, 47890),

Gene: Wocket\_77 Start: 47897, Stop: 48673, Start Num: 91

Candidate Starts for Wocket\_77:

(Start: 91 @47897 has 63 MA's), (118, 48074), (131, 48146), (136, 48203), (141, 48224), (143, 48236), (154, 48344), (192, 48530), (196, 48539),

Gene: Zarbodnamra\_81 Start: 47607, Stop: 48383, Start Num: 91

Candidate Starts for Zarbodnamra\_81:

(Start: 91 @47607 has 63 MA's), (118, 47784), (131, 47856), (136, 47913), (141, 47934), (143, 47946), (154, 48054), (181, 48192), (192, 48240), (196, 48249),

Gene: ZiggyZoo\_78 Start: 49093, Stop: 49869, Start Num: 91

Candidate Starts for ZiggyZoo\_78:

(40, 48874), (Start: 91 @49093 has 63 MA's), (118, 49270), (131, 49342), (141, 49420), (143, 49432), (154, 49540), (192, 49726), (196, 49735), (201, 49759),